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The examination will be found at the end of each lesson.

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RCA INSTITUTES

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DEFINITIONS AND SYMBOLS

This lesson contains standardized radio definitions and symbols only and does not require an examination. However, it should be always available to the student as a ready reference when studying the lessons of the course. It is not expected that the student will understand the entire contents of this lesson until he will have completed the course.

We express our thanks to the Institute of Radio Engineers for permission to make use of their definitions and symbols.

"A" POWER SUPPLY: A power supply device which provides heating current for the cathode of a vacuum tube.

ACCEPTOR: A circuit of inductance and capacity which is so arranged and tuned as to offer low impedance to currents of a given frequency, and high impedance to currents of any other frequency.

ACOUSTIC IMPEDANCE: The acoustic impedance of a sound medium on a given surface is the complex quotient of the pressure (force per unit area) on that surface by the flux (volume velocity, or linear velocity multiplied by the area) through that surface. The acoustic impedance may be expressed in terms of mechanical impedance, acoustic impedance being equal to mechanical impedance divided by the square of the area of the surface considered.

ACOUSTIC RADIATOR: An acoustic radiator is that portion of a transducer which facilitates the radiation of sound vibrations.

ACOUSTIC REACTANCE: The acoustic reactance of a sound medium is the imaginary part of the acoustic impedance. It is the component of the acoustic impedance resulting from the effective mass or compliance of the medium.

ACOUSTIC RESISTANCE: The acoustic resistance of a sound medium is the real component of the acoustic impedance. This is the component of the acoustic impedance associated with the dissipation of energy.

ACTIVE TRANSDUCER: An active transducer is one in which the power supplied to the second system is obtained from a local source and is controlled by the power from the first system.

AERIAL: An elevated conductor portion of a condenser antenna.

AERIAL CIRCUIT: The components between the free or insulated end of the aerial and the connection with the earth.

AIR CONDENSER: A condenser having air as its dielectric material.

ALTERNATING CURRENT: A current, the direction of which reverses at regularly recurring intervals, the algebraic average value being zero.

ALTERNATION: An alternation is one-half cycle of e.m.f. or current, or the rise and fall in one direction.

ALTERNATOR: An electrical machine for generating alternating e.m.f.

ALTERNATOR TRANSMITTER: A radio transmitter which utilizes radio-frequency power generated by a radio-frequency alternator.

AMMETER: An instrument connected in series in a circuit to measure the current flowing.

AMPERE: The standard electrical unit of current is the ampere, and it is the current established in a circuit of 1 ohm resistance by an electromotive force of 1 volt.

AMPERE-HOUR: The ampere-hour is the unit for expressing the quantity of electricity passing through a circuit under test, when a current of 1 ampere is established in a circuit for a period of one hour.

AMPLIFIER: A device for increasing the amplitude of electric current, voltage or power, through the control by the input power of a larger amount of power supplied by a local source to the output circuit.

AMPLIFICATION FACTOR: A measure of the effectiveness of the grid voltage relative to that of the plate voltage in affecting the plate current; it is the ratio of the change in plate voltage to a change in grid voltage in the opposite direction, under the condition that the plate current remains unchanged.

AMPLITUDE: The amplitude of a wave is a measure of the maximum deviation from its zero or normal axis.

ANODE: The electrode to which the electron stream flows.

ANTENNA: A device for radiating or absorbing radio waves.

ANTENNA FORM FACTOR: The ratio of the effective height of an antenna to its actual physical height.

ANTENNA RESISTANCE: An effective resistance which is numerically equal to the quotient of the average power in the entire antenna circuit by the square of the effective current at the point of maximum current.

Note: Antenna resistance includes: Radiation resistance, ground resistance, radio-frequency resistance of conductors in antenna circuit, equivalent resistance due to corona, eddy currents, insulator leakage, dielectric loss, etc.

APERIODIC: That which has no definite individual period.

APERIODIC CIRCUIT: An aperiodic circuit is a circuit which possesses electrical properties which prevent it from oscillating.

ARC: An arc is formed by the passage of an electric current through a gas or vapor, the conductivity of which is mainly due to the ionization of the gas or vapor.

ARC CONVERTER: An electric arc used for the generation of alternating or pulsating current.

ARC RECTIFIER: A device for changing a-c. to d-c.

ARTICULATION: Articulation of an electro-acoustic transducer is a measure of its ability to transmit detached speech syllables and is expressed as a percentage of the total syllables spoken which are correctly understood by the listener at the output of a transmission system including the transducer as the only source of distortion of detectable magnitude.

ARRESTER: Apparatus with suitably arranged electrodes and short air-gap, placed in series with the ground lead of a transmitter or receiver; a lead is taken to the receiving apparatus from the side of the spark-gap remote from the ground; used for controlling signals on circuit, and for keeping the antenna grounded in thunder storms and other electrical disturbances.

ATMOSPHERIC ABSORPTION: A loss of power in transmission of radio waves due to a dissipation in the atmosphere.

ATMOSPHERICS: Strays produced by atmospheric conditions. (See STATIC)

ATTENUATION: The reduction in power of a wave or a current with increasing distance from the source of transmission.

ATTENUATION EQUALIZER: A device for altering the total transmission loss of a circuit for various frequencies in order to make substantially equal the total transmission loss for all frequencies within a certain range.

AUDIO FREQUENCY: A frequency corresponding to a normally audible sound wave. The upper limit ordinarily lies between 10,000 and 20,000 cycles.

AUDIO-FREQUENCY TRANSFORMER: A transformer for use with audio-frequency currents.

AUDION: See Vacuum Tube.

AUTODYNE RECEPTION: A system of heterodyne reception through the use of a device which is both an oscillator and a detector.

"B" POWER SUPPLY: A power supply device connected in the plate circuit of a vacuum tube.

BAFFLE: A baffle is a partition which may be used with a free radiator to impede circulation from front to back.

- BAND OF FREQUENCIES:** A continuous range of frequencies extending between two definite frequencies.
- BANKED WINDING:** A form of coil winding in which single turns are wound successively in each of two or more layers, the winding proceeding from one end of the coil to the other, without return.
- BAND-PASS FILTER:** A filter designed to pass currents of frequencies within a continuous band limited by an upper and a lower critical or cut-off frequency and substantially reduce the amplitude of currents of all frequencies outside of that band.
- BAR:** A pressure of one dyne per square centimeter is called a bar.
- BATTERY:** A battery is a combination of two or more cells.
- BEAM ANTENNA:** A unilateral directive antenna such that its radiation is substantially confined to a narrow beam.
- BEAT:** A complete cycle of such pulsations.
- BEAT FREQUENCY:** The number of beats per second. This frequency is equal to the difference between the frequencies of the combining waves.
- BEATING:** A phenomenon in which two or more periodic quantities of not greatly different frequencies react with each other to produce a resultant having pulsations of amplitude.
- BEAT RECEPTION:** See Heterodyne Reception.
- BILATERAL ANTENNA:** An antenna having the property of radiating or receiving radio waves in large proportion in angular regions 180 degrees apart than in all other directions.
- BREATHING:** Breathing is a slow and for the most part periodic variation in the resistance (and microphoniness) of a carbon microphone. It may be of relatively large magnitude and is not in general audible.
- BROADCASTING:** Radio transmission intended for general reception.
- BRUSH DISCHARGE:** A discharge occurring on the surface of conductors charged to high potential.
- BURNING:** Burning is a rapid, transitory and for the most part nonperiodic resistance fluctuation in a carbon microphone. It is evidenced by a frying or sputtering noise sometimes heard from a connected receiver.
- BUS BAR:** A broad lead to which smaller leads from the units of a power line, condenser, battery bank, or switchboard, are joined.
- BUZZER, TUNED:** A common buzzer with the coils of an electromagnet shunted by a non-inductive resistance.
- BY-PASS CONDENSER:** A condenser used to provide an alternating current path of comparatively low impedance around some circuit element.

"C" POWER SUPPLY: A power supply device connected in the circuit between the cathode and grid of a vacuum tube so as to apply a grid bias.

CAGE ANTENNA: An antenna having conductors which consist of groups of parallel wires arranged as the elements of a cylinder.

CAPACITIVE COUPLING: The association of one circuit with another by means of capacity common or mutual to both.

CAPACITOR: (same as condenser) A device employed in radio circuits to introduce the elements of capacitance.

CAPACITY: The capacity of a condenser, or better, its capacitance, is a measure of the amount of electrical energy which the condenser can store up.

CARBON CONTACT PICKUP: A carbon contact pickup is a phonograph pickup which depends for its operation upon the variation in resistance of one or more carbon contacts.

CARBON MICROPHONE: A carbon microphone is one using one or more carbon contacts.

Burning is a rapid, transitory and for the most part nonperiodic resistance fluctuation in a carbon microphone. It is evidenced by a frying or sputtering noise sometimes heard from a connected receiver.

Breathing is a slow and for the most part periodic variation in the resistance (and microphonicness) of a carbon microphone. It may be of relatively large magnitude and is not in general audible.

Packing in a carbon microphone is a condition caused by excess mechanical pressure between points of contact or by adherence between points of contact resulting from excessive voltages. It is evidenced by decreased resistance and sensitivity of the microphone.

CARRIER CURRENT: An alternating current which is modulated by a signal. Ordinarily refers to wire transmission of high-frequency currents.

CARRIER FREQUENCY: Frequency of a carrier wave or a carrier current.

CARRIER SUPPRESSION: That method of operation in which the carrier wave or carrier current is not transmitted.

CARRIER WAVE: The component of a modulated wave which has the same frequency as the original unmodulated wave.

CASCADE: A series of condensers or stages of amplification.

CATHODE: The electrode from which the electron stream flows.

CATHODE, INDIRECTLY HEATED: A cathode in which the heat is supplied from a separate heater element.

CAT WHISKER: A fine wire used to make contact with the surface of a crystal detector.

CHANGEOVER SWITCH: A special switch arranged to shift the antenna connection from the sending to the receiving apparatus and vice versa.

CHOKE COIL: An inductance coil inserted in a circuit to offer reactance to the flow of alternating-current components while allowing direct current to pass.

CHOPPER: A chopper is a device for rapidly opening and closing a circuit.

CIRCUIT-BREAKER: A circuit-breaker is a special type of switch so arranged as to open a circuit rapidly and without injury to itself.

COHERER: A device used in the early days of radio communication for detecting the presence of electromagnetic waves; usually consisted of a glass tube containing metallic filings making connection between two electrodes.

COMMUTATOR: A device for reversing the direction of electric current in a circuit.

COMPLIANCE: The compliance of a mechanical element is its deflection per unit of force. This is the reciprocal of its stiffness. Compliance in a mechanical system is analogous to capacitance in an electrical system and is expressed in centimeters per dyne. Negative compliance (reciprocal of negative stiffness) occurs in a case of unstable equilibrium where a small displacement results in a force tending to give a further displacement in the same direction.

CONDENSER: A condenser is a device for storing up electrical energy. It usually consists of two or more conducting surfaces separated by an insulating medium called the dielectric.

CONDENSER ANTENNA: An antenna consisting of two capacity areas.

CONDENSER LOUDSPEAKER: A condenser loudspeaker is one in which the mechanical forces are obtained by varying the voltage between two electrodes of a condenser forming a part of an electrical circuit.

CONDENSER MICROPHONE: A condenser microphone is one the operation of which involves a variation in the electrostatic capacity produced by a sound wave.

CONDENSER PICKUP: A condenser pickup is a phonograph pickup whose electrical output is generated by a mechanical variation of its charged capacity.

CONDUCTIVITY: The conductivity of a substance is a measure of its ability to carry electric current.

CONICAL HORN: A conical horn is a horn whose equivalent sectional radius has a constant rate of increase.

CONSTRAINED RADIATOR: A constrained radiator is an acoustic radiator, the sound from which is originated in a constrained portion of the medium.

CONTINUOUS WAVES: Alternating electric waves in space, of constant amplitude and frequency.

COUNTERPOISE: A system of wires or other conductors, forming the lower capacity area of a condenser antenna elevated above and insulated from the ground.

CONTROL ELECTRODE: The electrode, the voltage between which and the cathode controls the current flowing between the anode and the cathode.

CONVERTER: A machine employing mechanical rotation in changing electrical energy from one form to another.

CORRECTED RADIO BEARING: A radio bearing to which the calibration correction has been applied.

COULOMB: The coulomb is the quantity of electricity or the charge transmitted in 1 second by a current of 1 ampere.

COUPLER: A device employed to transfer radio-frequency power from one circuit to another by associating together portions of these circuits. Couplers are of the same types as the types of coupling; namely, inductive, capacitive and resistance.

COUPLING: The association of two circuits in such a way that energy may be transferred from one to the other.

COUPLING COEFFICIENT: The ratio of the mutual or common impedance component of two circuits to the square root of the product of the total impedance components of the same kind in two circuits. (Impedance components may consist of inductance, capacity or resistance.)

CURRENT AMPLIFICATION (OF AN AMPLIFIER): The ratio of the alternating current produced in the output circuit to the alternating current supplied to the input circuit.

CYCLE: One complete set of the recurrent values of a periodic phenomenon.

DAMPED ALTERNATING CURRENT: An alternating current passing through successive cycles with progressively diminishing amplitude.

DAMPED IMPEDANCE: The damped impedance of an electro-acoustic transducer is the impedance measured at the terminals of its electrical system when the impedance of the attached mechanical system is infinite or vice versa.

DAMPED WAVES: Electromagnetic waves proceeding in wave trains in each of which the amplitude of successive cycles progressively diminishes.

DAMPING CONSTANT: The Napierian logarithm of the ratio of two values of an exponentially decreasing quantity separated by unit time.

DECREMETER: An instrument for measuring the logarithmic decrement of a train of waves.

DECREMENT: Percentage of decrease of amplitude in oscillation.

DETECTOR: That portion of the receiving apparatus which, connected to a circuit carrying currents of radio-frequency, and in conjunction with a self-contained or separate indicator, translates the radio-frequency power into a form suitable for operation of the indicator. This translation may be effected either by the conversion of the radio-frequency power, or by means of the control of local power. The indicator may be a telephone receiver, relaying device, tape recorder, etc.

The most common type of detector is a vacuum tube operated on a non-linear portion of its characteristic curve, thereby converting a modulated radio-frequency current into a modulated direct current.

A tube which operates similarly to a detector tube, but the output of which does not operate an indicator, may properly be called a frequency converting tube.

DIAPHRAGM: A diaphragm is a vibrating surface which produces sound vibrations.

DIELECTRIC: Dielectric is an insulating substance that allows electrostatic induction to act across it, as the insulating medium between the plates of a condenser.

DIODE: A type of vacuum tube containing two electrodes which passes current wholly or predominantly in one direction.

Note: A vacuum tube having a single cathode and two anodes which operate alternately may properly be called a double diode.

DIRECT CAPACITANCE (C) - BETWEEN TWO CONDUCTORS: The ratio of the charge produced on one conductor to the voltage between it and the other conductor divided by this voltage, all other conductors in the neighborhood being at the potential of either conductor.

DIRECT COUPLING: Association of two radio circuits by having an inductor, a condenser, or a resistor common to both circuits.

DIRECT CURRENT: A unidirectional current. As ordinarily used, the term designates a practically non-pulsating current.

DIRECTIONAL ANTENNA: An antenna having the property of radiating or receiving radio waves in larger proportion along some directions than others. An antenna of this type used for transmitting is often called a directive antenna.

DIRECTION-FINDER CALIBRATION: The determination of the direction and amount of fixed local wave front distortion to the end that the correct bearing may be obtained.

DIRECTION FINDER (GONIOMETER): A radio receiving device which permits determination of the line of travel of waves as received.

DISCHARGER: A device in an oscillating circuit by which the spark or arc discharge is controlled. (Also called spark discharger).

DISTORTION: A change in wave form occurring in a transducer or transmission medium when the output wave form is not a faithful reproduction of the input wave form. The principal sources of distortion are:

- a. Non-linear relation between input and output at a given frequency.
- b. Non-uniform transmission at various frequencies.
- c. Phase shift not proportional to frequency.

DOUBLE MODULATION: The process of modulation in which a carrier wave of one frequency is first modulated by the signal wave and is then made to modulate a second carrier wave of another frequency.

DRIVER ELEMENT: The driver element of a telephone receiver is that portion of the receiver which receives power from the electrical system and converts it into mechanical power.

DRY CELL: A dry cell is a type of primary cell in which the electrolyte is in the form of a paste.

DUPLIX OPERATION: The operation of associated transmitting and receiving channels in which the processes of transmission and reception are concurrent.

EARTH: That connection of the lower extremities of an antenna system for completing an electric circuit to the ground.

EDDY CURRENTS: Induced electric currents occurring when a metallic mass is acted upon by a changing magnetic field, or the mass rotated in a magnetic field, which consume a considerable amount of energy.

EFFECTIVE HEIGHT OF AN ANTENNA: The height of an equivalent ideal antenna. As ordinarily defined, this ideal antenna is a vertical conductor carrying a uniform current equal to the maximum current existing at any point in the actual antenna.

Note: This applies most strictly to antenna systems producing or affected by a substantially vertical electric field.

ELECTRO-ACOUSTIC TRANSDUCER: An electro-acoustic transducer is a transducer which is actuated by power from an electrical system and supplies power to an acoustic system or vice versa.

ELECTRICAL OSCILLATION: An electrical oscillation is a complete cycle of high or audio-frequency current.

ELECTRICAL PHONOGRAPH RECORDER: An electrical phonograph recorder is an electromechanical transducer actuated by power in an electrical system and supplying power to a recording mechanical system, the recorded wave form produced by the mechanical system corresponding to the wave form in the electrical system.

ELECTROMAGNETIC LINES OF FORCE: Electromagnetic lines of force are the lines of force set up by all current-carrying conductors.

ELECTROLYTIC DETECTOR: A sensitive form of detector (now obsolete) consisting of an electrolytic cell, usually with a very small anode of insoluble material, such as platinum, and a larger cathode immersed in an electrolyte of 10 per cent sulphuric acid solution. Oscillations from an outside source depolarize the anode and changes occur in the local current which acts upon the telephone receiver.

ELECTROMAGNETIC WAVE: The propagation of electrical energy through space set into motion by the displacement current about a radio transmitting antenna.

ELECTROMOTIVE FORCE: Electromotive force is the voltage or electrical pressure that causes electricity to flow in a circuit.

ELECTRON: An electron is assumed to be the smallest known particle of matter and is an active charge of negative electricity.

ELECTRON EMISSION: The phenomenon of the liberation of electrons from the surface of a body into the surrounding space, usually under the influence of heat, illumination, x-rays, impact excitation, or chemical disintegration.

ELECTRON TUBE: An electron tube is one whose operation depends primarily upon a flow of electrons from one element to another.

ELECTROSCOPE: An instrument for detecting small static charges.

E.M.F.: Abbreviation for Electromotive Force.

EMISSION CHARACTERISTIC: The graph plotted between a factor controlling electron emission (such as the temperature, voltage or current of the cathode or filament) as abscissas and the total emission from the cathode or filament as ordinates. (See Grid Characteristic; Plate Characteristic; and Mutual Characteristic.)

EQUISIGNAL RADIO RANGE: A radio range which transmits two distinctive signals which may be received with equal intensity only in certain directions.

EQUISIGNAL ZONE: A region in which two distinctive signals from an equisignal radio range are received with equal intensity.

EXPONENTIAL HORN: An exponential horn (sometimes called logarithmic horn) is a horn whose sectional area varies exponentially with its length.

FACSIMILE TRANSMISSION: The electrical transmission of a copy or reproduction of a picture, drawing, or document. (This is also called picture transmission).

FADING: The variation of the signal intensity received at a given location from a radio transmitting station as a result of changes occurring in the transmission path.

FARAD: The farad is the unit of capacity and represents the charge in a condenser when an electromotive force of 1 volt will place into it an electric charge of 1 coulomb.

FEED RATIO (OF A MULTIPLE TUNED ANTENNA): The value obtained by dividing the sum of the currents at all the antinodes by the current in the line feeding the antenna.

FIDELITY: The degree to which a system, or a portion of a system, accurately reproduces at its output the signal which is impressed upon it.

FILAMENT: A cathode in which the heat is supplied by current passing through the cathode.

FILAMENT CAPACITANCE (C_f): The sum of the direct capacitances between the filament and all other conductors of a vacuum tube.

FILAMENT CURRENT: The current supplied to the filament to heat it.

FILAMENT VOLTAGE: The voltage between the terminals of the filament.

FILTER: A selective circuit network, designed to pass currents within a continuous band or bands of frequencies or direct current, and substantially reduce the amplitude of currents of undesired frequencies.

FIXED CONDENSER: A fixed condenser is one whose plates are stationary and whose capacity cannot be changed.

FLAT-TOP ANTENNA: An antenna having approximately horizontal conductors at the top.

FLUX: By the flux of a coil is meant the electromagnetic lines of force produced by a current in that coil.

FORCE FACTOR: The force factor of an electro-acoustic transducer is a measure of the coupling between its electrical and mechanical systems. It is the ratio of the open circuit force or voltage in the secondary system to the current or velocity in the primary system.

FORCED ALTERNATING CURRENT: The alternating current which flows in a circuit as the result of an impressed alternating voltage and which has the same frequency.

FREE ALTERNATING CURRENT: The damped alternating current which flows in a circuit following the cessation of an impressed voltage.

FREE RADIATOR: A free radiator is an acoustic radiator, the sound from which is originated in an unconstrained medium.

FREQUENCY: The number of cycles per second.

FREQUENCY CHANGER: A device delivering alternating current at a frequency which differs from the frequency of the supply current.

FREQUENCY METER: An instrument for measuring frequency. Frequency meters used in radio work are sometimes called wavemeters.

FREQUENCY MULTIPLIER: A frequency changer used to multiply by an integer the frequency of an alternating current.

FULL-WAVE RECTIFIER: A double element rectifier arranged so that current is allowed to pass in the same direction to the load circuit during each half cycle of the alternating current supply, one element functioning during one-half cycle and the other during the next half cycle, and so on.

FUNDAMENTAL FREQUENCY: That frequency of which all component frequencies are integral multiples.

FUNDAMENTAL OR NATURAL FREQUENCY (OF AN ANTENNA): The lowest resonant frequency of an antenna, without added inductance or capacity.

FUNDAMENTAL WAVELENGTH: The wavelength corresponding to fundamental frequency.

GALVANOMETER: A sensitive instrument for indicating the presence of an electric current in a circuit, and determining its direction.

GENERATOR: An electric generator is a device or machine for converting mechanical energy into electrical energy.

GONIOMETER: Same as Direction Finder.

GRID: An electrode having openings through which the electron stream between cathode and anode may pass.

GRID BIAS: The direct component of the grid voltage.

GRID CAPACITANCE (C_g): The sum of the direct capacitances between the grid and all other conductors of a vacuum tube.

GRID CHARACTERISTIC: The graph plotted between grid voltage as abscissas and grid current as ordinates. (See Plate Characteristic; Mutual Characteristic and Emission Characteristic).

GRID CONDENSER: A series condenser in the grid or control circuit of a vacuum tube.

GRID CONDUCTANCE: The ratio of the change in grid current to the change in grid voltage producing it, under the condition of constant plate potential.

GRID CURRENT: The direct current passing from the grid through the vacuum space.

GRID-FILAMENT CAPACITANCE (C_{gf}): The direct capacitance between the grid and the filament.

GRID LEAK: A resistor used to affect or determine the grid bias.

GRID-PLATE CAPACITANCE (C_{gp}): The direct capacitance between the grid and the plate.

GRID VOLTAGE: The voltage between the grid and a specified point of the cathode.

GROUND: Same as Earth.

GROUND EQUALIZER INDUCTORS: Coils of relatively low inductance placed in the circuit connected to one or more of the grounding points of an antenna ground system, to divide the current between the various points in any desired way.

GROUND SYSTEM (OF AN ANTENNA): That portion of the antenna system below the antenna loading devices or generating apparatus most closely associated with the ground and including the ground itself.

GROUND WIRE: A conductive connection to the earth.

GROUP FREQUENCY: The number of trains of damped waves or current per second.

HALF-WAVE RECTIFIER: A rectifier which changes alternating current into pulsating current, utilizing only one-half of each cycle.

HARMONIC: A component of a periodic quantity having a frequency which is an integral multiple of the fundamental frequency. For example, a component the frequency of which is twice the fundamental frequency is called the second harmonic.

HARP ANTENNA: An antenna composed of vertical, or approximately vertical conductors, all in one plane.

HELIX: A hollow conducting coil or solenoid.

HENRY: A henry is the unit of inductance, and a circuit has an inductance of 1 henry when a current changing at the rate of 1 ampere per second produces an induced e.m.f. of 1 volt.

HERTZIAN WAVES: Electromagnetic waves first observed by Hertz, which originate in a rapidly vibrating or alternating current and are projected far into surrounding space. Radio communication is a practical application of this discovery.

HETERODYNE RECEPTION: The process of receiving radio waves by combining the received voltage with locally generated alternating voltage. The locally generated frequency is commonly different from the received frequency, thus producing beats. This is called beat reception.

HIGH-FREQUENCY CURRENT: A current where several thousand or more oscillations take place in a second of time.

HIGH-PASS FILTER: A filter designed to pass currents of all frequencies above a critical or cut-off frequency and substantially reduce the amplitude of currents of all frequencies below this critical frequency.

HOMODYNE RECEPTION: The process of detecting a wave by the aid of a locally generated wave of carrier frequency. (Sometimes called zero-beat reception).

HONEYCOMB COIL: A multiple layer coil wound diagonally in lattice like formation.

HORN: A horn is a constrained radiator consisting of a tube of varying sectional area for determining the shape of the constrained portion of the medium.

HOT-WIRE AMMETER: (Expansion type): An ammeter dependent for its indications on a change in dimensions of an element which is heated by a current through it.

HYDROMETER: An instrument for measuring the specific gravity of the electrolyte in a storage cell to give an indication of the state of charge of the cell.

HYSTERESIS: Expenditure and loss of energy in the form of heat due to the work required to change the molecules; takes place in process of magnetizing and de-magnetizing.

IDEAL TRANSDUCER: An ideal transducer for connecting two specific systems is a passive transducer which converts the maximum possible power from the electrical system to the acoustic system or vice versa.

IMPEDANCE: The impedance is the total opposition of a circuit to the passage of an alternating current.

IMPULSE EXCITATION: A method of producing damped oscillatory current in a circuit in which the duration of the impressed voltage is short compared with the duration of the current produced.

INDUCTANCE: The inductance of a circuit is its property that allows it to store up electrical energy in electromagnetic form.

INDUCTION: The influence exerted by the interference or influence of fields upon fields or fields upon conductors.

INDUCTION LOUDSPEAKER: An induction loudspeaker is a moving coil loudspeaker in which the current which reacts with the polarizing field is induced in the moving member.

INDUCTIVE COUPLING: The association of one circuit with another by means of inductance common or mutual to both. (This term when used without modifying words is commonly used for coupling by means of mutual inductance, whereas coupling by means of self-inductance common to both circuits is called "direct inductive coupling".

INDUCTOR: A device used in radio circuits to introduce the element of inductance.

INPUT ADMITTANCE: The reciprocal of input impedance.

INPUT IMPEDANCE: The ratio of the alternating voltage impressed on the input terminals of the device to the alternating current thereby produced at these terminals, in the absence of impressed alternating voltages at other points.

INSULATOR: An insulator is a material that presents such a high opposition to a flow of electricity that there is not a perceptible flow through that material.

INTERFERENCE: Confusion of reception due to strays, undesired signals or other causes; also that which produces the confusion.

INTERMEDIATE FREQUENCY: A frequency between that of the carrier employed in radio transmission and the frequency of modulation, and to which the carrier is converted in super-heterodyne reception.

INTERNAL OUTPUT ADMITTANCE: The reciprocal of internal output impedance.

INTERNAL OUTPUT IMPEDANCE: The ratio of the alternating voltage impressed on the output terminals of a vacuum tube to the alternating current thereby produced at these terminals, in the absence of impressed alternating voltages at other points.

Note: This is sometimes called simply "output impedance" but the prefix "internal" is preferred in order more surely to distinguish it from the impedance of the external output circuit.

INTERRUPTED CONTINUOUS WAVES: Waves obtained by interruption at audio-frequency in a periodic manner of an otherwise continuous wave.

INTERRUPTER: Apparatus for breaking up a continuous current into a succession of pulses.

INVERTED "L" ANTENNA: A flat top antenna the lead-in of which is taken from one end of the horizontal portion.

IONIZATION: The breaking up of a compound into positive and negative ions.

JAMMING: Interference, malicious or otherwise, from undesired stations.

JOULE: The practical unit of electrical energy; denotes work done by one coulomb under one volt pressure.

KEY: A key is a special form of switch arranged for rapid operation to form dots and dashes of the telegraph codes.

KEY-MODULATED WAVES: Continuous waves of which the amplitude or frequency is varied by the operation of a transmitting key in accordance with the characters of a communicating code.

KILOCYCLE (STRICTLY KILOCYCLE PER SECOND): A thousand cycles per second.

KILOWATT: One thousand watts.

LEAD-IN That portion of an antenna system which completes the electrical connection between the elevated outdoor portion and the instruments or disconnecting switches inside the building.

LEYDEN JAR: A condenser composed of a glass jar with inner and outer surfaces coated with copper.

LIGHTNING ARRESTER: A lightning arrester is a device for protecting a circuit or apparatus from lightning or other excessively high voltages.

LOADING COIL: An inductor inserted in a circuit to increase its inductance but not to provide coupling with any other circuit.

- LODESTONE:** A natural ore possessing inherent qualities of magnetism.
- LOGARITHMIC DECREMENT:** The Napierian logarithm of the ratio of the first to the second of two successive amplitudes in the same direction, for an exponentially damped alternating current. The logarithmic decrement can also be considered as a constant of a simple radio circuit, being π times the product of the resistance and the square root of the ratio of the capacity to the inductance of the circuit.
- LOOP ANTENNA:** An antenna consisting of one or more complete turns of wire. This is also called a coil antenna.
- LOW FREQUENCY CURRENT:** A current where a limited number of oscillations, about 60 to 500 cycles, take place in a second of time.
- LOUDSPEAKER:** A loudspeaker is a telephone receiver designed to radiate acoustic power into a room or open air.
- LOW-PASS FILTER:** A filter designed to pass currents of all frequencies below a critical or cut-off frequency and substantially reduce the amplitude of currents of all frequencies above this critical frequency.
- MAGNETIC FIELD:** The region surrounding a magnet through which magnetic forces act.
- MAGNETIC LOUDSPEAKER:** A magnetic loudspeaker is one in which the mechanical forces result from magnetic reactions.
- MAGNETIC MICROPHONE:** A magnetic microphone is one whose electrical output is generated in a coil or conductor in a magnetic circuit or field.
- MAGNETIC MODULATOR:** A magnetic device employed as a modulator and functioning by virtue of its non-linear magnetization characteristic.
- MAGNETIC PICKUP:** A magnetic pickup is a phonograph pickup whose electrical output is generated in a coil or conductor in a magnetic circuit or field.
- MAGNETOSTRICTION LOUDSPEAKER:** A magnetostriction loudspeaker is a magnetic loudspeaker in which the mechanical forces are obtained by magnetostriction.
- MASTER OSCILLATOR:** An oscillator of comparatively low power so arranged as to control the frequency of the output of an amplifier.
- MECHANICAL IMPEDANCE:** The mechanical impedance of a mechanical system is the complex quotient of the alternating force applied to the system by the resulting alternating linear velocity in the direction of the force at its point of application.
- MECHANICAL REACTANCE:** The mechanical reactance of a mechanical system is the magnitude of the imaginary component of the mechanical impedance. It may also be expressed as the component of the mechanical impedance of the system resulting from its effective mass or compliance.

MECHANICAL RESISTANCE: The mechanical resistance of a mechanical system is the real component of the mechanical impedance. It may also be expressed as the quotient of the power absorbed by the system by the square of the alternating velocity at the point of application of the force.

MEGACYCLE (STRICTLY MEGACYCLE PERSECOND): A million cycles per second.

MEGOHM: A megohm is a resistance of 1,000,000 ohms.

METER: (a) The meter is the unit of length in the metric system, largely used in European countries, and corresponds to a length of 39.37 inches.
(b) A meter is an instrument for measuring some quantity, as a voltmeter.

METER AMPERES: The product of the antenna current in amperes at the point of maximum current and the antenna effective height in meters for any radio transmitting station.

MICA: A mineral insulator.

MICROFARAD: A microfarad is a capacity of $1/1,000,000$ of a farad.

MICROPHONE: A microphone is an electro-acoustic transducer actuated by power in an acoustic system and delivering power to an electric system, the wave form in the electric system corresponding to the wave form in the acoustic system. This is also called a telephone transmitter.

MILLIAMPERE: A milliampere is a current of the strength of $1/1,000$ of an ampere.

MOBILE STATION: A station capable of moving and which ordinarily does move.

MODULATED WAVES: Continuous waves of which the amplitude or frequency is repeatedly varied in accordance with a signal wave.

MODULATION: The process whereby the frequency or amplitude of a wave is varied in accordance with a signal wave.

MODULATOR: A device to effect the process of modulation. It may be operated by virtue of some non-linear characteristic or by a controlled variation of some circuit quantity.

MONITORING RADIO RECEIVER: A radio receiver arranged to enable an operator to check the operation of a transmitting set.

MOTIONAL IMPEDANCE: The motional impedance of an electro-acoustic transducer is the vector difference between the normal and the damped impedance.

MOUTH OF A HORN: The mouth of a horn is the end with the larger cross sectional area.

MOVING IRON LOUDSPEAKER: A moving iron loudspeaker is a magnetic loudspeaker whose operation involves the vibration of a portion of the ferro-magnetic circuit.

MOVING COIL LOUDSPEAKER: A moving coil loudspeaker is a magnetic loudspeaker in which the mechanical forces are developed by the interaction of currents in a conductor and the polarizing field in which it is located. This is sometimes called an Electro-Dynamic or a Dynamic Loudspeaker.

MULTIPLE TUNED ANTENNA: An antenna with connections to ground or counterpoise through inductances at more than one point, the inductances being so determined that their reactances in parallel present a total reactance equal to that necessary to give the antenna the desired natural frequency.

MUTUAL CHARACTERISTIC (GRID-PLATE CHARACTERISTIC): The graph plotted between grid voltage as abscissas and plate current as ordinates. (See Grid Characteristic; Mutual Conductance; Plate Characteristic; and Emission Characteristic.)

MUTUAL CONDUCTANCE: The ratio of the change in plate current to the change in grid potential producing it, under the condition of constant plate voltage. (The unit ordinarily used is the micromho).

MUTUAL INDUCTANCE: Mutual inductance is the term applied to designate the inductance produced by a current change in one of two independent circuits which react upon each other.

NORMAL IMPEDANCE: The normal impedance of an electro-acoustic transducer is the impedance measured at the terminals of the electrical system when the mechanical system is connected to its load or vice versa.

OHM: An ohm is the unit of resistance, and may be defined as the resistance that will allow 1 ampere of current to pass under the pressure due to an electromotive force of 1 volt.

OSCILLATIONS: Electromagnetic waves set up in space by transmitting instruments.

OSCILLATION CONSTANT: The oscillation constant of an oscillating circuit is the numerical figure obtained from the square root of its inductance multiplied by its capacity.

OSCILLATION TRANSFORMER: An oscillation transformer is a special open type of transformer primarily used for transferring large amounts of oscillating energy from one circuit to another.

OSCILLATOR: A non-rotating device for producing alternating power, the output frequency of which is determined by the characteristics of the device.

OSCILLATORY CIRCUIT: A relatively low resistance circuit containing both inductance and capacity, such that a voltage impulse will produce a current which periodically reverses.

PACKING: Packing in a carbon microphone is a condition caused by excess mechanical pressure between points of contact or by adherence between points of contact resulting from excessive voltages. It is evidenced by decreased resistance and sensitivity of the microphone.

PARALLEL CONNECTION: A parallel connection of electrical devices or circuits is one in which the current divides, only a part of the total current passing through each device or circuit.

PARALLEL RESONANCE: A condition which exists in a circuit having inductance and capacity connected in parallel, when the supply current and supply voltage are in phase.

PASSIVE TRANSDUCER: A passive transducer is one in which the power supplied to the second system is obtained entirely from the power available from the first system.

PERCENTAGE MODULATION: The ratio of half the difference between the maximum and minimum amplitudes of a modulated wave to the average amplitude, expressed in per cent.

PERIOD: The period of an alternating current is the time required for one cycle to pass through a complete set of positive and negative values.

PERIODIC CURRENT: Periodically reversing current the frequency of which is determined by the electrical constants of the circuits in which it flows. It may be either damped or continuous.

PERIODIC TIME: The time of a completed period.

PHONOGRAPH PICKUP: A phonograph pickup is an electromechanical transducer actuated by a phonograph record and delivering power to an electrical system, the wave form in the electrical system corresponding to the wave form in the phonograph record.

PHOTOELECTRIC TUBE: A form of vacuum tube in which the electron emission is produced by the illumination of the cathode. (Also called the photoelectric cell.)

PIEZO-ELECTRIC LOUDSPEAKER: A piezo-electric loudspeaker is one in which the mechanical forces are obtained by use of a piezo-electric element.

PIEZO-ELECTRIC PICKUP: A piezo-electric pickup is a phonograph pickup whose electrical output is generated by varying mechanical stresses in the piezo-electric crystal.

PLATE: The common name for the anode in a vacuum tube.

PLATE CAPACITANCE (C_p): The sum of the direct capacitances between the plate and all other conductors of a vacuum tube.

PLATE CHARACTERISTIC: The graph plotted between plate voltage as abscissas and plate current as ordinates. (See Grid Characteristic; Mutual Characteristic; and Emission Characteristic.)

PLATE CIRCUIT: The plate circuit of an electron tube includes all the devices connected directly in the external circuit between the cathode and the plate elements.

PLATE CONDUCTANCE: The ratio of the change in plate current to the change in plate potential producing it, under the condition of constant grid potential.

PLATE CURRENT: The direct current passing from the plate through the vacuous space.

PLATE-FILAMENT CAPACITANCE (C_{pf}): The direct capacitance between the plate and the filament.

PLATE RESISTANCE: The reciprocal of the plate conductance.

PLATE VOLTAGE: The voltage between the plate and a specified point of the cathode.

POLARITY: The property of having opposite poles or electric signs (+ and -).

POTENTIAL: The degree of pressure of an electrical charge.

POTENTIOMETER: The potentiometer is an arrangement for obtaining any desired voltage by utilizing the voltage drop across the required portion of a current-carrying resistance.

POWER AMPLIFICATION (OF AN AMPLIFIER): The ratio of the alternating-current power produced in the output circuit to the alternating-current power supplied to the input circuit.

POWER AMPLIFIER: An amplifier that is capable of producing relatively large power in an output circuit.

POWER LEVEL: The power level at any point in a system is an expression of the power being transmitted past this point.

PRIMARY CELL: A primary cell is a type of cell whose voltage is directly due to the chemical decomposition of matter. (See dry cell).

PRIMARY COIL: A primary coil is the input winding of a transformer.

PROTECTIVE DEVICE: A device for keeping currents or voltages of undesirably large magnitude out of a given part of an electrical circuit. For example, fuse; lightning arrester.

PULSATING CURRENT: A periodic current, that is, current passing through successive cycles, the algebraic average value of which is not zero. A pulsating current is equivalent to the sum of an alternating and a direct current.

PUSH-PULL MICROPHONE: A push-pull microphone is one which makes use of two functioning elements 180 degrees out of phase.

RADIATE: To emit electromagnetic waves into space.

RADIATION: The process of emitting electromagnetic waves into space.

RADIATION EFFICIENCY: The radiation efficiency of an antenna is the ratio of power radiated to the total power delivered to the antenna, at a given frequency.

RADIATION RESISTANCE: The ratio of the total power radiated by an antenna to the square of the effective current at the point of maximum current.

RADIO-BEACON: A radio transmitting station in a fixed geographic location which emits a distinctive or characteristic signal for enabling mobile receiving stations to determine bearings or courses.

RADIO BEARING: The angle between the direction of the advance of the incoming radio wave and an arbitrarily fixed line (such as the center line of a ship).

RADIO CHANNEL: A band of frequencies or wavelengths of a width sufficient to permit of its use for radio communication. The width of a channel depends upon the type of transmission.

RADIO COMMUNICATION: Applies to the transmission by radio of writing, signs, signals, pictures, and sounds of all kinds.

RADIO COMMUNICATION STATION (OR RADIO STATION): Any station equipped to carry on radio communications.

RADIO COMPASS: A direction finder used for navigational purposes.

RADIO FIELD INTENSITY: The root-mean-square value of the electric or magnetic field intensity at a point due to the passage of radio waves. It is usually expressed in terms of the electric field intensity, in microvolts per meter or millivolts per meter.

RADIO FREQUENCY: A frequency higher than those corresponding to normally audible sound waves.

Note: It is not implied that radiation cannot be secured at lower frequencies, nor that radio-frequencies are necessarily above the limit of audibility.

RADIO-FREQUENCY ALTERNATOR: A rotating-type alternating current generator which generates radio-frequency power.

RADIO-FREQUENCY TRANSFORMER: A transformer for use with radio-frequency currents.

RADIO NOISE FIELD INTENSITY: A measure of the field intensity, at a point (as a radio receiving station) of electromagnetic waves of an interfering character. In practice the quantity measured is not the field intensity of the interfering waves, but some quantity which is proportional to or bears a known relation to the field intensity.

RADIO RANGE: A radio beacon which transmit directed waves by means of which departures from a given course may be observed.

RADIO RECEIVER: A device for converting radio waves into perceptible signals.

RADIO TRANSMITTER: A device for producing radio-frequency power and modifying it in accordance with a signal.

RADIO TRANSMISSION: The transmission of signals by means of radiated electromagnetic waves originating in a constructed circuit.

RADIO WAVE-FRONT DISTORTION: A change in the direction of advance of radio waves.

REACTANCE: Reactance is the term applied to express the opposition of a wire to changes of current established in it.

RECTIFIER: A device having an asymmetrical conduction characteristic which is used for the conversion of an alternating current into a pulsating current. Such devices include vacuum-tube rectifiers, gas rectifiers, oxide rectifiers, electrolytic rectifiers, etc.

Note: In dealing with rectification in the reception of radio signals the term "detector" is preferred to "rectifier".

REFLEX CIRCUIT: A circuit arrangement in which one or more amplifier tubes amplify the signal both before and after detection.

REFRACTION: The change in direction of the flow of an electric current when it passes from one medium to another of different conductivity or of other differing electric qualities.

REGENERATION: The process by which a part of the output power of an amplifying device reacts upon the input circuit in such a manner as to reinforce the initial power, thereby increasing the amplification. (Sometimes called "feed back" or "reaction".)

REJECTOR: A circuit of inductance and capacity which is so arranged and tuned as to offer high impedance to the flow of currents of a given frequency and low impedance to currents of all other frequencies.

RELAY: A device by means of which contacts in one circuit are operated by a change in conditions in the same circuit or in one or more associated circuits.

RESIDUAL MAGNETISM: The magnetism which remains in the core of an electromagnet after the circuit has been broken.

RESISTANCE: Resistance is the opposition to the passage of a direct current or low-frequency alternating current by any substance or material.

RESISTANCE COUPLING: The association of one circuit with another by means of resistance common to both.

RESISTIVITY: The resistivity of any material is a measure of its resistance or opposition to the flow of electricity.

RESISTOR: A device used in radio circuits to introduce the element of resistance.

RESONANCE: Two circuits are in resonance if they are in tune with each other, that is, if the products of the inductance and capacity of each are equal.

RESONANCE FREQUENCY (OF A REACTIVE CIRCUIT): The frequency at which the supply current and supply voltage of the circuit are in phase.

RESONANCE TRANSFORMER: A transformer with condenser load, whose circuits are adjusted as a whole to have the same frequency as that of the alternating current supplied to the primary, thereby causing the secondary voltage to build up to higher values than would otherwise be attained.

RHEOSTAT: A resistor which is provided with means for readily adjusting its resistance.

REVERSED GRID CURRENT: The direct current passing to the grid through the vacuous space.

RIPPLE FILTER: A low-pass filter designed to reduce the ripple current while freely passing the direct current from a rectifier or generator.

RIPPLE VOLTAGE: The alternating component of unidirectional voltage from a rectifier or generator. Per cent ripple is the ratio of the r.m.s. value of the ripple voltage to the algebraic average value of the total voltage expressed in percentage. (R.M.S. is the abbreviation for root mean square.)

SCREEN GRID: An electrode of suitable potential interposed between certain of the other electrodes of a vacuum tube to substantially eliminate the effect of the capacitance between them.

SCREEN-GRID VACUUM TUBE: A type of vacuum tube in which the capacitance between certain electrodes (ordinarily the control grid and the plate) is substantially eliminated by the interposition of an additional electrode of suitable potential.

SECONDARY CELL: Same as Storage Cell.

SELECTIVITY: The degree to which a radio receiver is capable of differentiating between signals of different carrier frequencies. This characteristic is not expressible by a single numerical value, but requires one or more graphs for its expression.

SELF-INDUCTANCE: Self-inductance is the property of electrical circuits which tends to prevent any change in the current established in the circuits.

SENSE FINDER: An addition to a direction finder which permits determination of the direction without 180 degrees ambiguity.

SELF-HETERODYNE RECEPTION: A system of heterodyne reception by utilizing a device which is both an oscillator and a detector.

SENSITIVITY: The degree to which a radio receiver responds to signals of the frequency to which it is tuned. It is measured quantitatively by the reciprocal of the Normal Radio Field Intensity.

SERIES OR FEED RESISTANCE (OF A MULTIPLE TUNED ANTENNA): The quotient of the power delivered to the antenna by the square of the current in the line feeding the antenna.

SERIES RESONANCE: A condition which exists in a circuit having inductance and capacity connected in series, when the supply current and supply voltage are in phase.

SIDE BANDS: The bands of frequencies, one on either side of the carrier frequency, produced by the process of modulation.

SIDE FREQUENCY: The frequency on either side of the carrier frequency produced by the process of single-frequency modulation.

SIGNAL-NOISE RATIO: The ratio at a point of the field intensity of the radio wave to the radio noise field intensity.

SIGNAL WAVE: A wave, the form of which conveys a signal.

SINE CURVE: A wave-like curve drawn to represent the changes in strength and direction of an alternating current or voltage.

SINGLE-SIDE-BAND TRANSMISSION: That method of operation in which one side band is transmitted, and the other side band is suppressed. The carrier wave may be either transmitted or suppressed.

SOLENOID: An electromagnetic coil without the iron core.

SPARK FREQUENCY: Same as Group Frequency.

SPARK GAP: An arrangement of electrodes used for closing a circuit (usually oscillatory) at a predetermined voltage. Among the types of spark gaps are plain gap, rotary gap, synchronous gap, and quenched gap.

SPARK TRANSMITTER: A radio transmitter which utilizes the oscillatory discharge of a condenser through an inductance and a spark gap as the source of its radio-frequency power.

SPECIFIC GRAVITY: The specific gravity of any substance is its weight in proportion to that of an equal volume of water.

SPECIFIC INDUCTIVE CAPACITY: The specific inductive capacity of a substance is a direct measure of its ability to store up electrical energy when used as a dielectric material in a condenser.

STATIC: Conduction or charging current in an antenna resulting from physical contact between the antenna and charged bodies or masses of gas.

Note: In the United States this term has come to be used quite generally as a synonym for atmospherics.

STOPPING CONDENSER: A condenser used to introduce a comparatively high impedance in some branch of a circuit for the purpose of limiting the flow of low-frequency alternating current or direct current without materially affecting the flow of high-frequency alternating current.

STORAGE CELLS: A storage cell is a type of cell in which the chemical changes of discharge may be reversed by an electric current to charge the cell to its original condition.

STRAYS: Electromagnetic disturbances in radio reception other than those produced by radio transmitting systems.

SUPER-HETERODYNE RECEPTION: A method of reception in which the received voltage is combined with the voltage from a local oscillator and converted into voltage of an intermediate frequency which is then amplified and detected to reproduce the original signal wave. (Sometimes called "supersonic reception" and "double detection").

SWINGING: The variation in frequency of a transmitted wave resulting from momentary changes in the transmitter circuits. This may be evidenced by

1. A variation in the beat note when a local oscillator is adjusted to the carrier frequency, or
2. A variation in intensity of the received signal.

SYNCHRONY: The adjustment of one circuit to another, or of a transmitter to a receiver, so that their time periods are the same.

SYNTONIC CIRCUITS: Syntonic circuits are two or more oscillating circuits having similar time periods or natural frequency of oscillation.

"T" ANTENNA: A flat top antenna the lead-in of which is taken from about the center of the horizontal portion.

TANK CIRCUIT: An intermediate oscillatory circuit associated with the output circuit of a vacuum tube transmitter which absorbs the output of the vacuum tube transmitter in the form of energy impulses of high value and short duration and delivers the power to the load in substantially sinusoidal form.

TELEPHONE RECEIVER: A telephone receiver is an electro-acoustic transducer actuated by power from an electrical system and supplying power to an acoustic system, the wave form in the acoustic system corresponding to the wave form in the electrical system.

TELEVISION: The electrical transmission of a succession of images and their reception in such a way as to give a substantially continuous reproduction of the object or scene before the eye of a distant observer.

TETRODE: A type of vacuum tube containing an anode, a cathode, and two additional electrodes (ordinarily the two additional electrodes are of the nature of grids).

TICKLER: A tickler is the name sometimes applied to the coil in the plate circuit used to feed some of the energy back into the grid circuit.

THERMAL RECEIVER: A thermal receiver is a telephone receiver in which the temperature of a conductor is caused to vary in response to the current input, thereby producing sound waves as a result of the expansion and contraction of the adjacent air.

THERMIONIC: Relating to electron emission under the influence of heat.

THERMOCOUPLE AMMETER: An ammeter dependent for its indications on the change in thermo electromotive force set up in a thermo electric couple which is heated by the current to be measured.

THROAT OF A HORN: The throat of a horn is the end with the smaller cross sectional area.

TIME PERIOD: Ascertained by the amount of inductance, capacity and resistance in the circuit.

TORQUE: The value of forces tending to produce rotation.

TOTAL EMISSION: The value of the current carried by electrons emitted from a cathode under the influence of a voltage such as will draw away all the electrons emitted.

TRANSFORMER: A transformer is a device for transferring energy from one circuit to another.

TRANSDUCER: A transducer is a device actuated by power from one system and supplying power to another system. These systems may be electrical, mechanical, or acoustic.

TRANSMISSION-FREQUENCY CHARACTERISTIC: A graph showing the transmission efficiency of a circuit or transmission path as ordinates and the frequency as abscissas.

TRANSMISSION LEVEL: The radio field intensity or the signaling power amplitude at any point in a communication system, expressed either in some absolute unit or with reference to an arbitrary base value.

TRANSMISSION LOSS: The loss of power suffered by a transmitted wave in passing along a transmission path or through a circuit device.

TRANSMISSION UNIT (THE DECIBEL--"db"): The transmission unit is used for expressing certain performance indices of electro-acoustic transducers. This unit is logarithmic in nature and possesses a unique relation with the physiological response of the ear; namely, over the usual range of sound intensities one transmission unit corresponds very closely to the minimum perceptible change in loudness. The interpretation of the significance of the performance indices in terms of what one may expect to hear is thereby facilitated by expressing them in transmission units.

TRICKLE CHARGER: A device designed to charge a storage battery at a low rate continuously or during a major portion of the 24 hour day.

TRIODE: A type of vacuum tube containing an anode, a cathode, and a third electrode, in which the current flowing between the anode and the cathode is controlled by the voltage between the third or control electrode and the cathode.

TUNING: The adjustment of a circuit or system to secure optimum value of a desired current; commonly, the adjustment of a circuit or circuits to resonance.

UMBRELLA ANTENNA: An antenna, the conductors of which form elements of a cone with the apex at the top to which the lead-in is connected.

UNDAMPED WAVE: A train of waves in which the amplitude of each successive wave is equal to that of the wave preceding and following it.

UNILATERAL ANTENNA: An antenna having the property of radiating or receiving radio waves in larger proportion in some one angular region than in all other directions.

VACUUM TUBE: A device consisting of a number of electrodes contained within an enclosure evacuated to such a degree that the characteristics are substantially due to electron conduction.

Note: Where it is desired to call particular attention to the number of electrodes, the terms diode, triode, and tetrode may be used.

VACUUM-TUBE MODULATOR: A modulator employing a vacuum tube as a modulating element.

VACUUM-TUBE RECTIFIER: A tube which rectifies an alternating current by utilizing the electron flow between two electrodes in a vacuum or in a gas.

VACUUM-TUBE TRANSMITTER: A radio transmitter in which vacuum tubes are utilized to convert the applied electric power into radio-frequency power.

VACUUM-TUBE VOLTMETER: A device utilizing the characteristics of a vacuum tube for measuring alternating voltages.

VALVE: Same as Vacuum Tube. (The term "valve" is used widely in England).

VARIABLE CONDENSER: A variable condenser is one whose electrical capacity may be changed or varied.

VARIOCOUPLER: A variocoupler is composed of a set of coils, generally so arranged as to make it possible to vary the coupling between different circuits.

VARIOMETER: A variometer consists of two coils which may be placed in such relative position that the inductance effects of each winding may be made to assist or practically neutralize each other.

VOLT: A volt is the unit of electromotive force and is the electrical pressure required to send a current of 1 ampere through a resistance of 1 ohm.

VOLTAGE AMPLIFICATION: The ratio of the alternating voltage produced at the output terminals of an amplifier to the alternating voltage impressed at the input terminals. (This term should not be used to describe a process.)

VOLTAGE DIVIDER: A resistor provided with fixed or movable contacts and with two fixed terminal contacts. Current is passed between the terminal contacts and the desired voltage is obtained across a portion of the resistor. The term "Potentiometer" is often erroneously used for this device.

VOLTMETER: An instrument of high resistance for measuring difference of potential in volts, or the voltage in a circuit.

WATT: A watt is the unit of electrical power, and represents the product of current and electromotive force.

WAVE: (a) A propagated disturbance, usually periodic; as an electric wave or a sound wave.
(b) A single cycle of such a disturbance.
(c) A periodic variation as represented by a graph.

WAVE ANTENNA: A horizontal aerial the physical length of which is of the same order of magnitude as that of the signaling waves to be received, and which is so used as to be strongly directional.

WAVE FRONT DISTORTION: A change in the direction of advance of radio waves.

WAVELENGTH: The distance traveled in one period or cycle by a periodic disturbance. The distance between corresponding phases of two consecutive waves of a wave train. The quotient of velocity by frequency.

WAVEMETER: A wavemeter is a device arranged and calibrated to read the length of a radiated wave directly in meters. (Also known as frequency meter.)

WAVE-TRAIN: A wave-train is a short series of cycles of alternating current interrupted or separated by quiet periods.

ZERO-BEAT RECEPTION: The process of detecting a wave by the aid of a locally generated wave of carrier frequency.

ABBREVIATIONS

<u>Term</u>	<u>Abbreviation</u>
Alternating-current	a-c
Ampere	a
Antenna	ant.
Audio-frequency	a-f.
Continuous waves	CW
Cycle per second	~
Decibel	db
Direct-current	d-c
Electromotive Force	e.m.f.
Frequency	f
Ground	gnd.
Henry	h
Intermediate-frequency	i-f.
Interrupted continuous waves	ICW
Kilocycles (per second)	kc.
Kilowatt	kw.
Megohm	M
Microfarad	μ f or mfd.
Microhenry	μ h
Micromicrofarad	$\mu\mu$ f or mmfd.
Microvolt	μ v
Microvolt per meter	μ v/m
Millivolt per meter	mv/m
Milliwatt	mw
Ohm	Ω
Power Factor	p.f.
Radio-frequency	r.f.
Volt	v

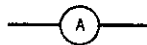
ABBREVIATIONS FOR METRIC PREFIXES

<u>Prefix</u>	<u>Abbreviation</u>
centi	c
deci	d
deka	dk
hecto	h
kilo	k
mega	M
micro	μ
milli	m

STANDARD RADIO SYMBOLS COURTESY, INSTITUTE OF RADIO ENGINEERS



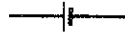
AERIAL



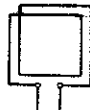
AMMETER



ARC



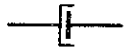
BATTERY
THE POSITIVE ELECTRODE
IS INDICATED
BY THE LONG LINE.



COIL ANTENNA



CONDENSER
FIXED



CONDENSER
FIXED SHIELDED



CONDENSER
VARIABLE



CONDENSER
VARIABLE (WITH MOVING
PLATE INDICATED)



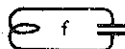
CONDENSER
VARIABLE, SHIELDED



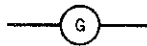
COUNTERPOISE



CRYSTAL DETECTOR



FREQUENCY METER
WAVEMETER



GALVANOMETER



GLOW LAMP



GROUND



INDUCTOR



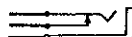
INDUCTOR
ADJUSTABLE



INDUCTOR
IRON CORE



INDUCTOR
VARIABLE



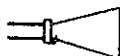
JACK



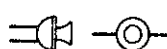
KEY



LIGHTNING
ARRESTER



LOUD
SPEAKER



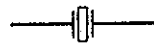
MICROPHONE
TELEPHONE
TRANSMITTER



PHOTO ELECTRIC
CELL

STANDARD RADIO SYMBOLS

COURTESY, INSTITUTE OF RADIO ENGINEERS



PIEZOELECTRIC
PLATE



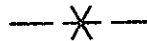
RESISTOR



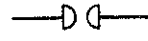
RESISTOR
ADJUSTABLE



RESISTOR
VARIABLE



SPARK GAP
ROTARY



SPARK GAP
PLAIN



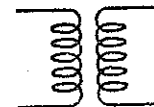
SPARK GAP
QUENCHED



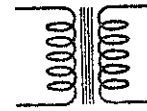
TELEPHONE RECEIVER



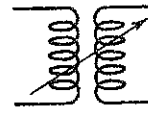
THERMOELEMENT



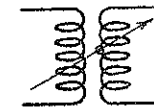
TRANSFORMER
AIR CORE



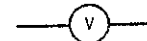
TRANSFORMER
IRON CORE



TRANSFORMER
WITH VARIABLE COUPLING



TRANSFORMER
WITH VARIABLE
COUPLING
(WITH MOVING
COIL INDICATED)



VOLTMETER



WIRES
JOINED



WIRES
CROSSED, NOT JOINED

VACUUM TUBES



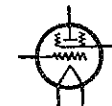
DIODE
OR HALF-WAVE
RECTIFIER



TRIODE
WITH DIRECTLY
HEATED CATHODE



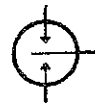
TRIODE
WITH INDIRECTLY
HEATED CATHODE



SCREEN GRID
WITH DIRECTLY
HEATED CATHODE



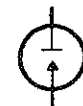
SCREEN GRID
WITH INDIRECTLY
HEATED CATHODE



RECTIFIER, FULL-WAVE
FILAMENTLESS



RECTIFIER FULL-WAVE
WITH DIRECTLY
HEATED CATHODE



RECTIFIER, HALF-WAVE
FILAMENTLESS



RCA INSTITUTES

INC.
formerly
MARCONI INSTITUTE
Founded 1909



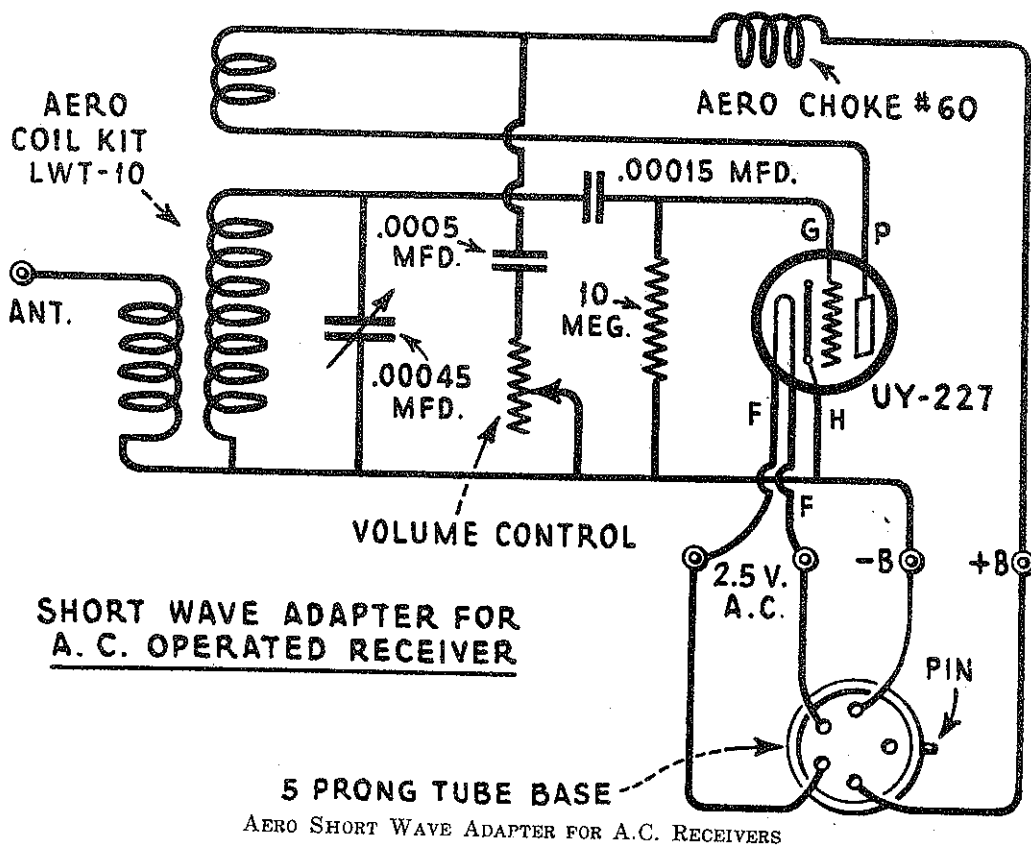
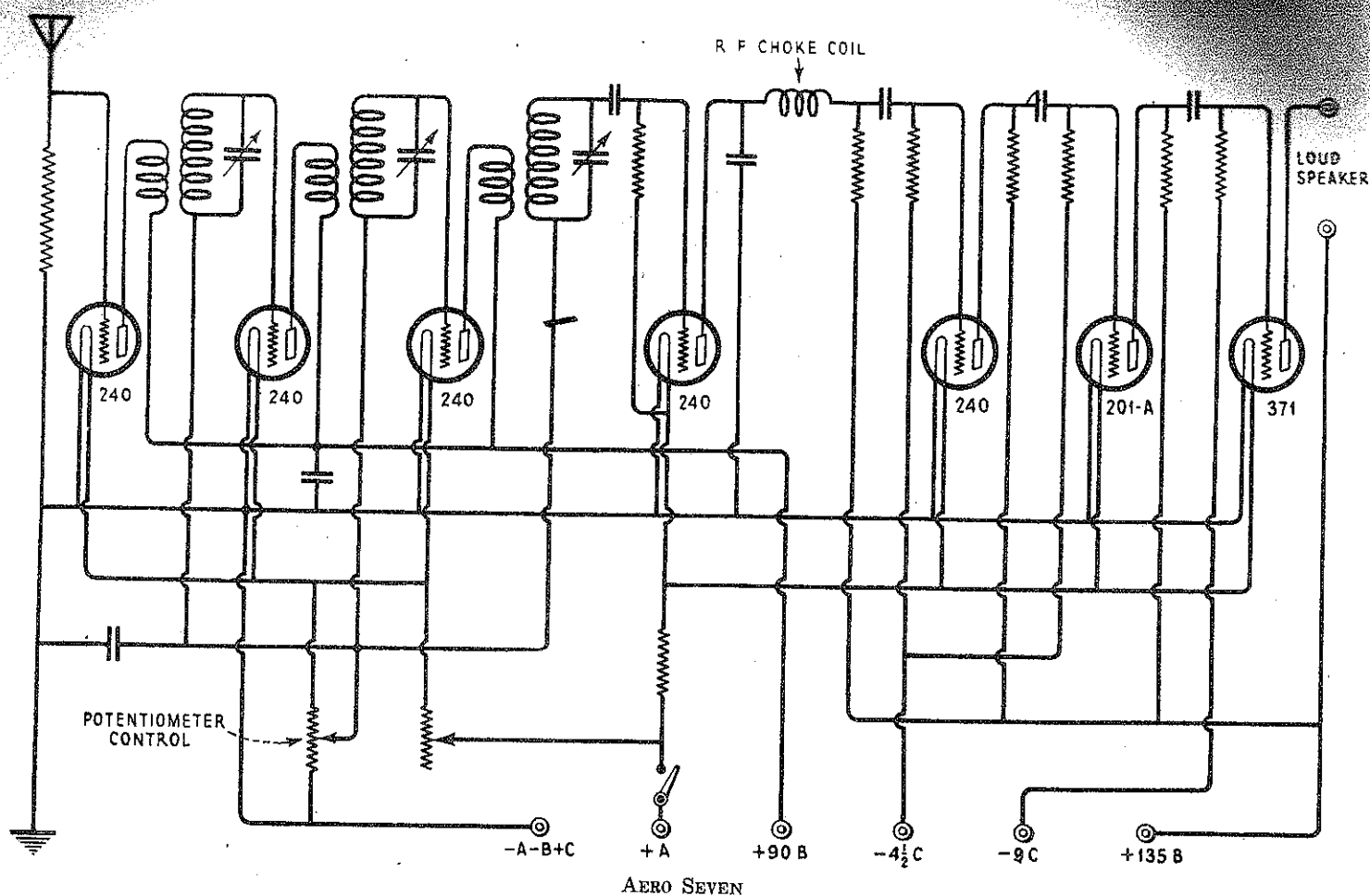
RECEIVING SET DIAGRAMS - PART I

	Sheet		Sheet
Aero Seven	2	Grebe Synchrophase	14
Aero Short Wave Adapter for A.C. Receivers	2	Hammerlund Roberts H1-Q.	15
Aero Short Wave Adapter for Battery Operated Receivers	3	King - Model FF.	15
Amrad A.C. 7	3	King - Model H	16
Apex 36 All-electric	4	King - 62 TRF.	16
Atwater Kent 20.	4	Kolster 6K	17
Atwater Kent 30.	5	Majestic A.C.	17
Atwater Kent 32.	5	Mohawk All-American Lyric - - Models 60, 61, 62, 65, and 66.	18
Atwater Kent 35.	6	Mohawk All-American Lyric - - Models 80, 83, 84, 85, and 88.	18
Atwater Kent 40.	6	Pfansteihl 34 and 50 A.C.	19
Balkite- Model A	7	Philco Electric - - Series 5	19
Bosch 28	7	RCA -- Radiola 16.	20
Bremer Tully 7-70.	8	RCA -- Radiola 17.	20
Browning Drake- 34, 36 & 38.	8	RCA -- Radiola 18 A.C.	21
Colonial 31 A.C.	9	RCA -- Radiola 18 D.C.	21
Crosley 608.	9	RCA -- Radiola 60.	22
Crosley 704-A.	10	RCA -- Radiola 62.	22
Daven Bass Note.	10	Roberts A.C.	23
Day Fan A.C. Power Set	11	Silver Marshall - Model 630.	23
Day Fan 35 D.C.	11	Sparton Equasonne -- Model 89.	25
Fada-- Models 10, 11, 30 and 31 (60 cycles)	12	Splitdorf Inherently Electric.	25
Fada-- Models 10Z, 11Z, 30Z and 31Z (25 cycles).	12	Steinite 261.	26
Federal Ortho-sonic A.C.	12	Stewart Warner -- Models 801, 801A, 811 and 811A --	26
Freed Eisemann NR 5.	13	Series B.	26
Freed Eisemann NR 80	13	Stromberg Carlson -- Models 635 and 636.	27
Freshman Equaphase	24	Zenith -- Models 11, 12 and 14.	27
Freshman - Model G	24		
Gilfillan GN 6	14		

Characteristics of Receiving Vacuum tubes .. 28

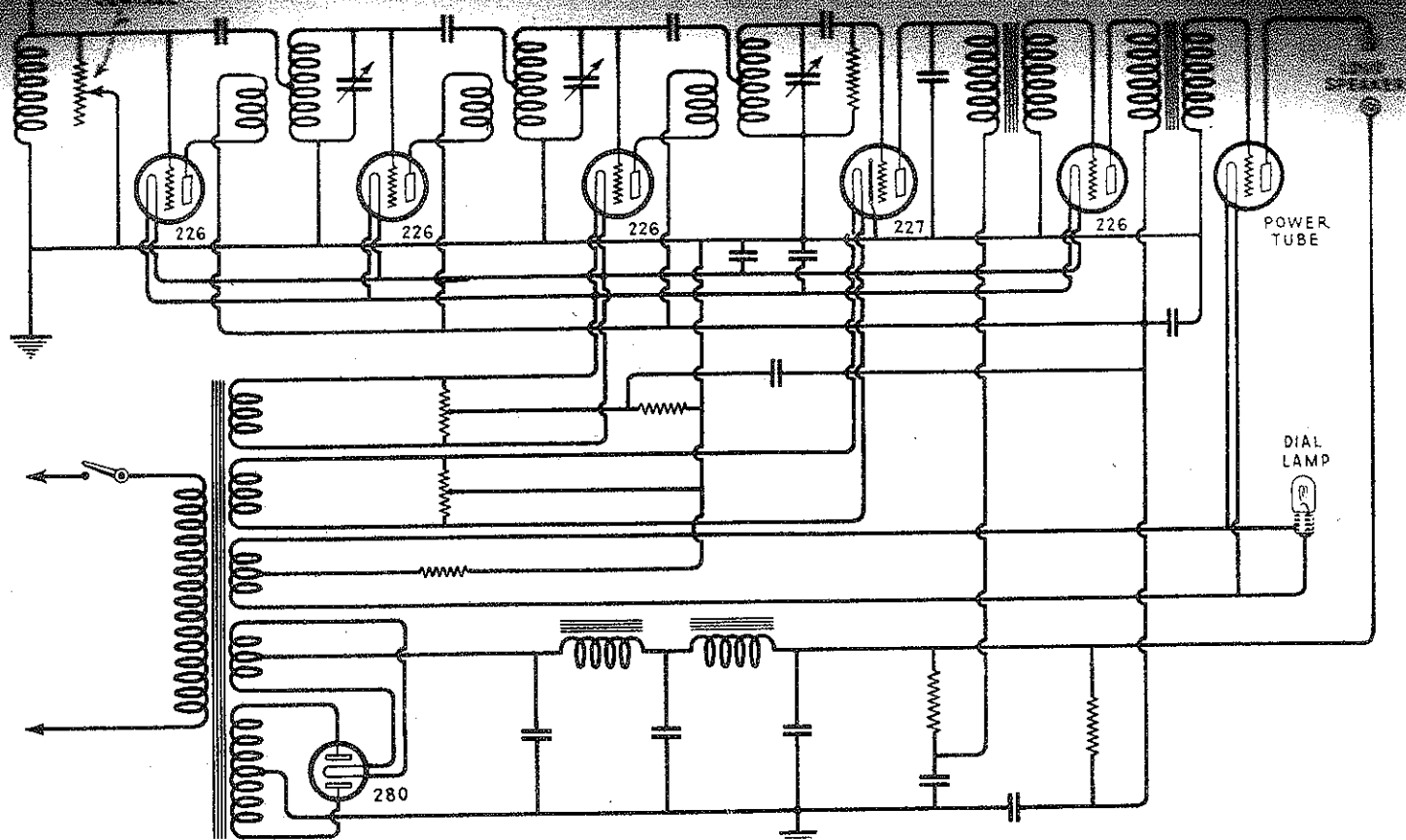
PART II

Atwater Kent Model 55.	29	RCA -- Radiola 28 - A.C.	34
Brandes Model B - 15 and 16.	29	RCA -- Radiola 28 - Battery.	35
Crosley R.F.L. 90.	30	RCA -- Radiola 25.	36
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Fada Models 50, 70, 71 & 72.	31	RCA -- Radiola 44.	37
Freed-Eisemann NR 55 A.C.	31	RCA -- Radiola 66.	38
Freed-Eisemann NR 78.	32	Stromberg -Carlson No. 641	38
Grebe Synchrophase-Battery	32	Stromberg -Carlson No. 846	39
Grebe A.C. Six	33	Zenith 17.	39
Majestic Model 90.	33		

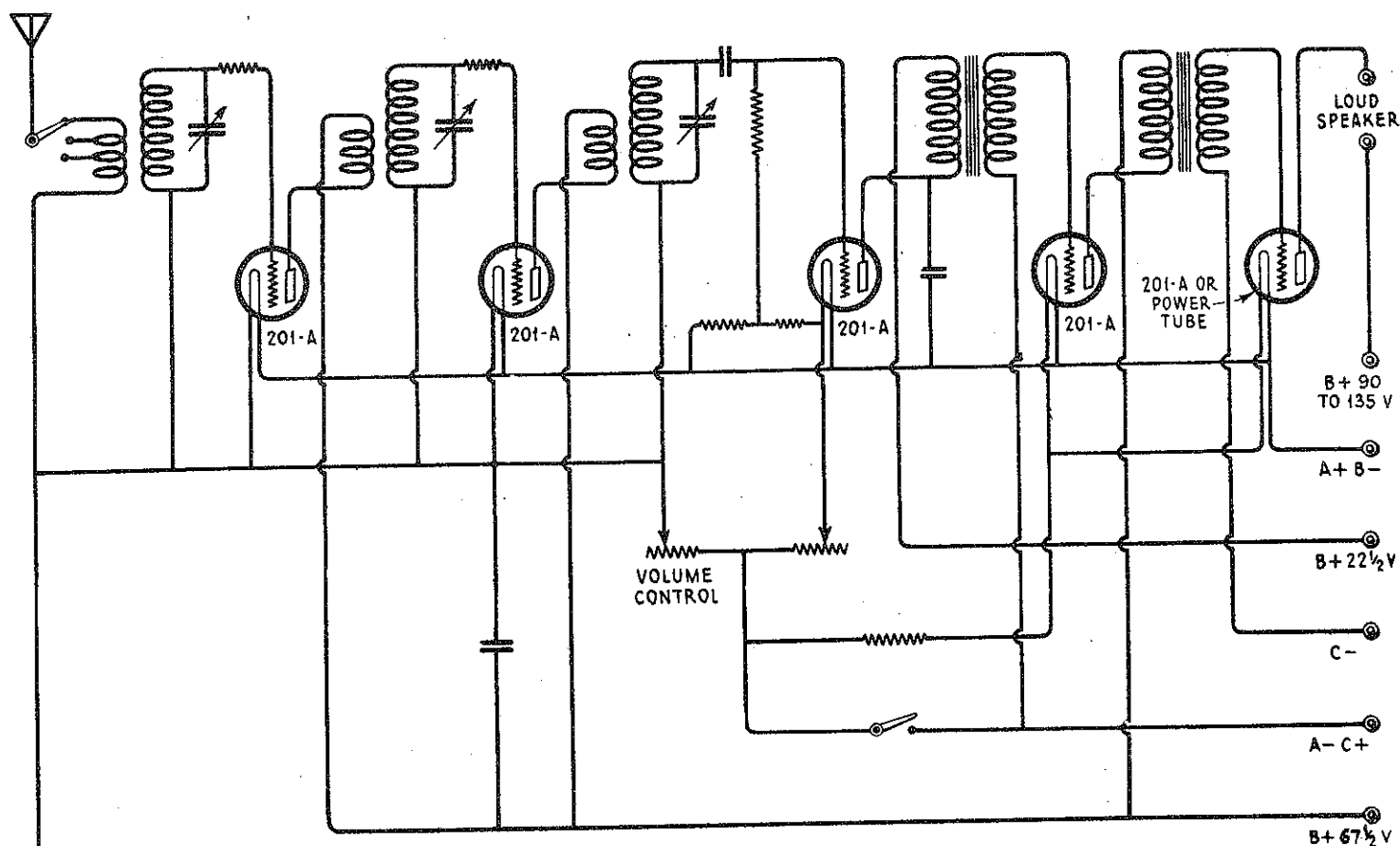




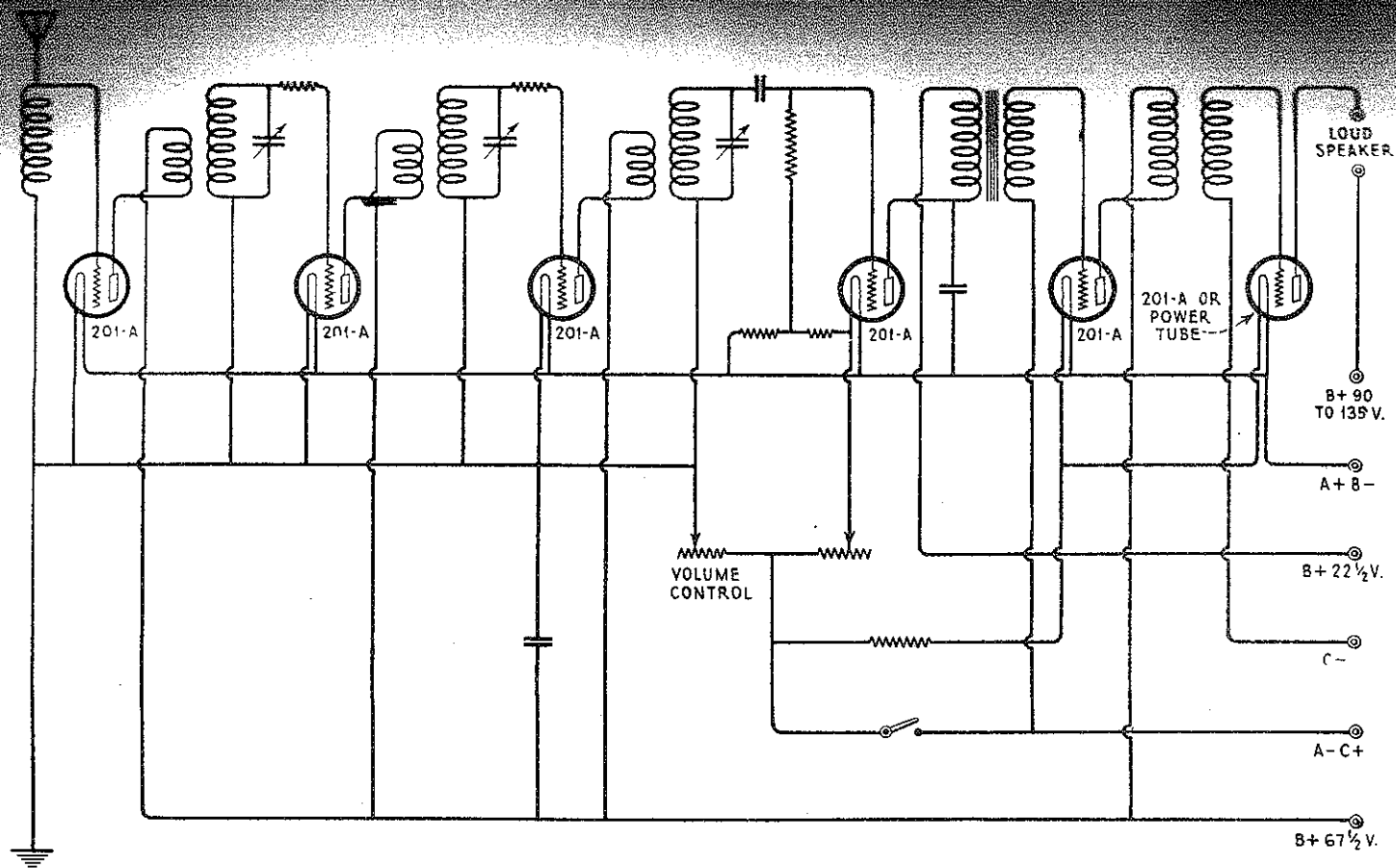
4 PRONG TUBE BASE



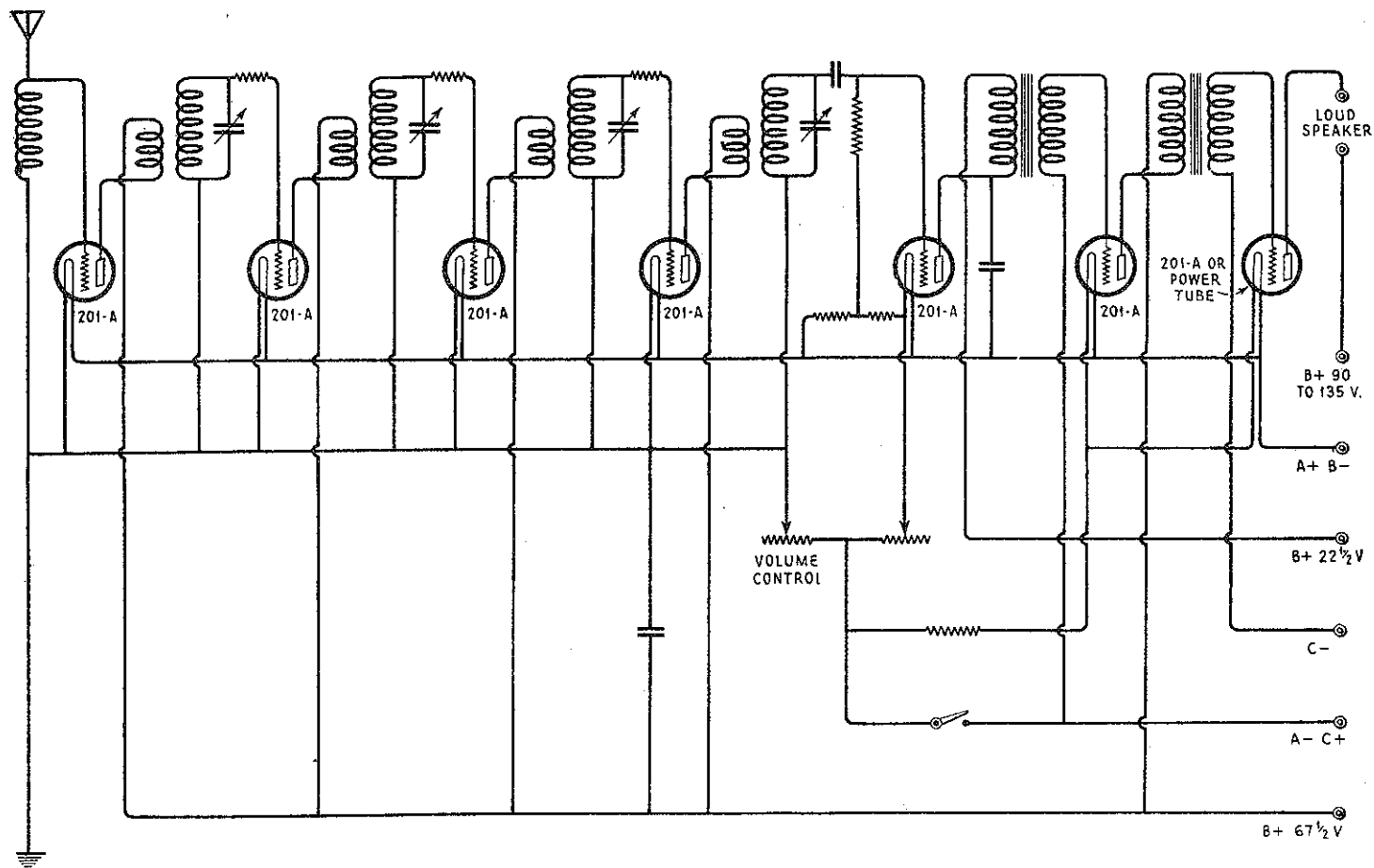
APEX 36—ALL ELECTRIC



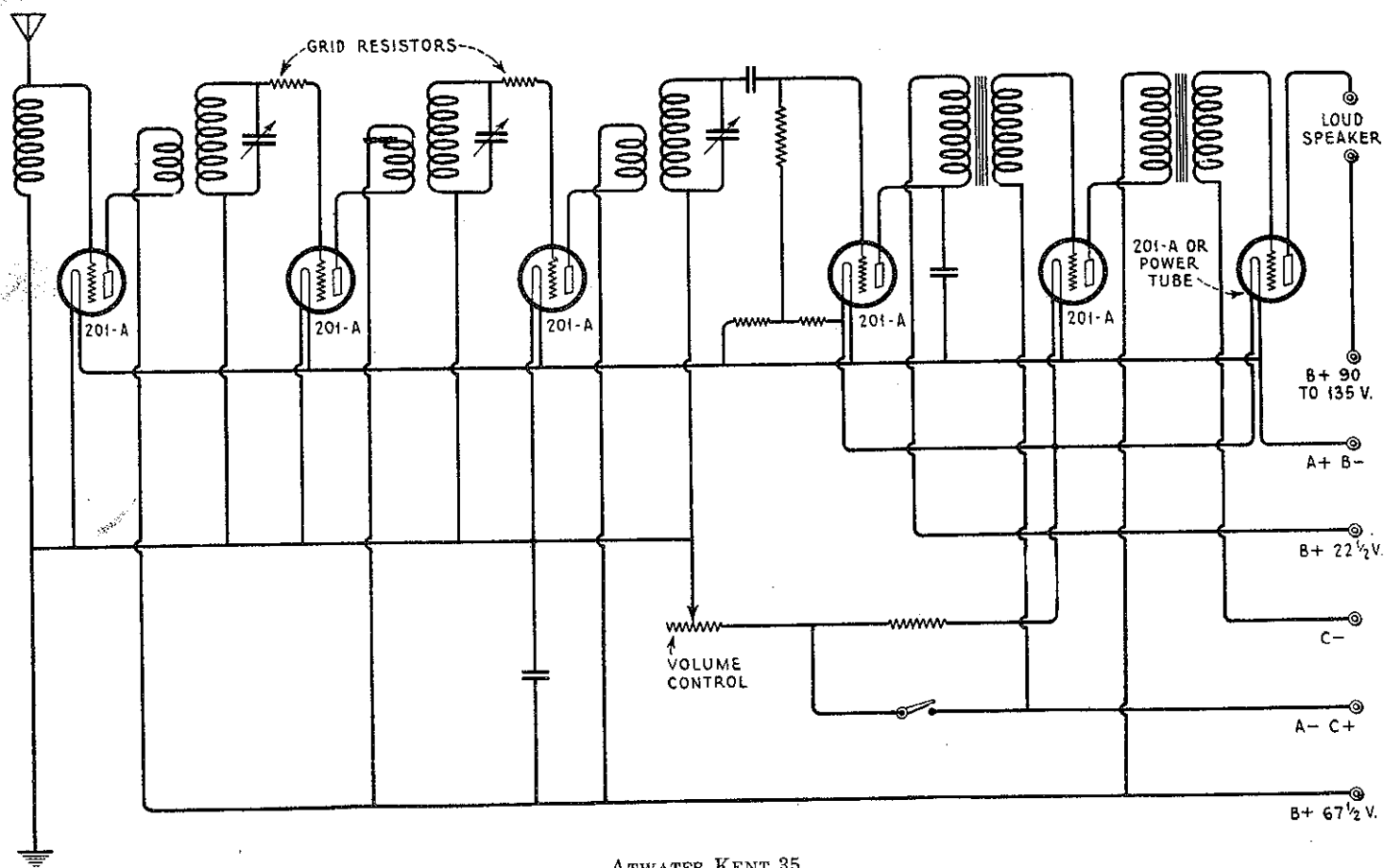
ATWATER KENT 20



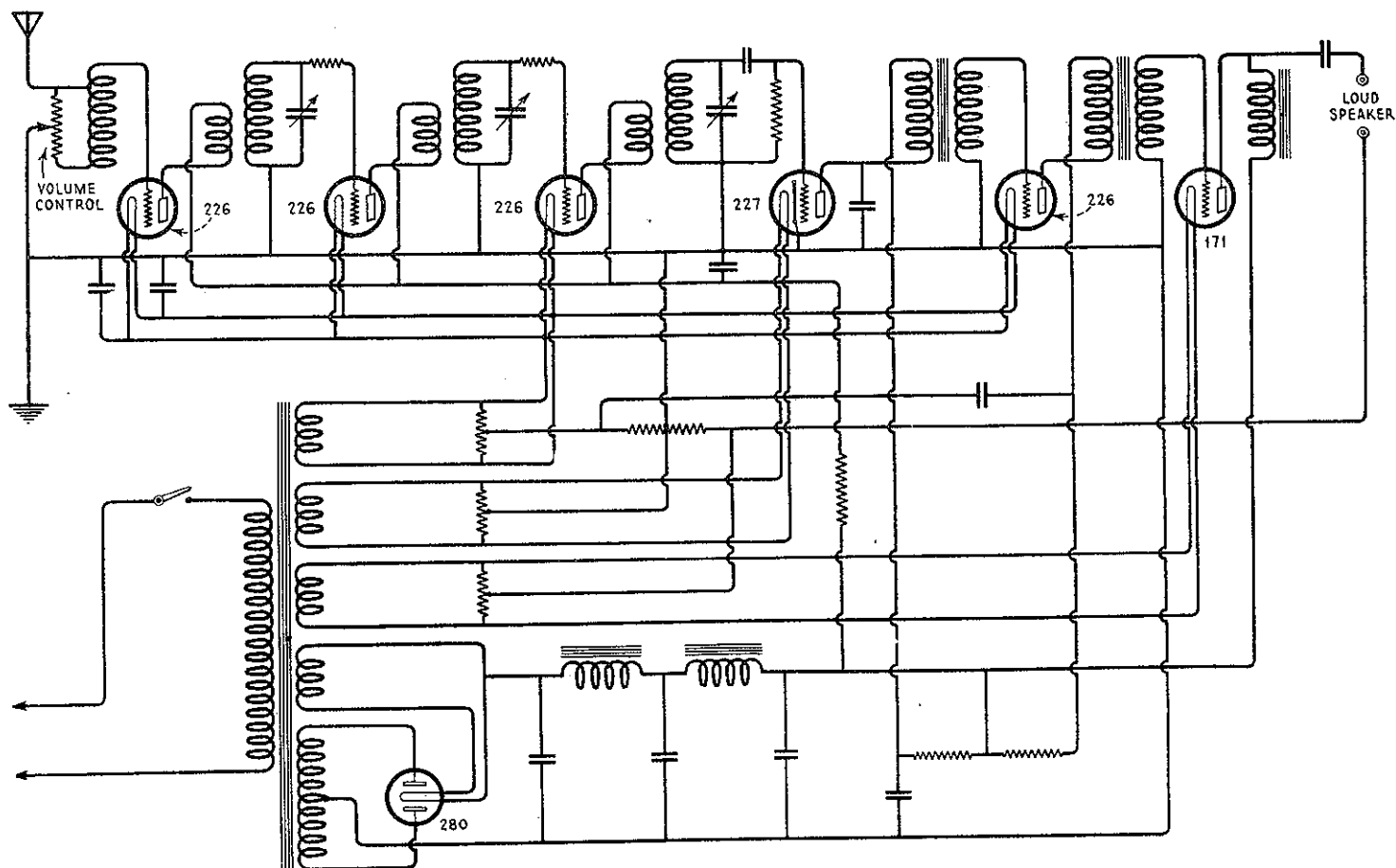
ATWATER KENT 30



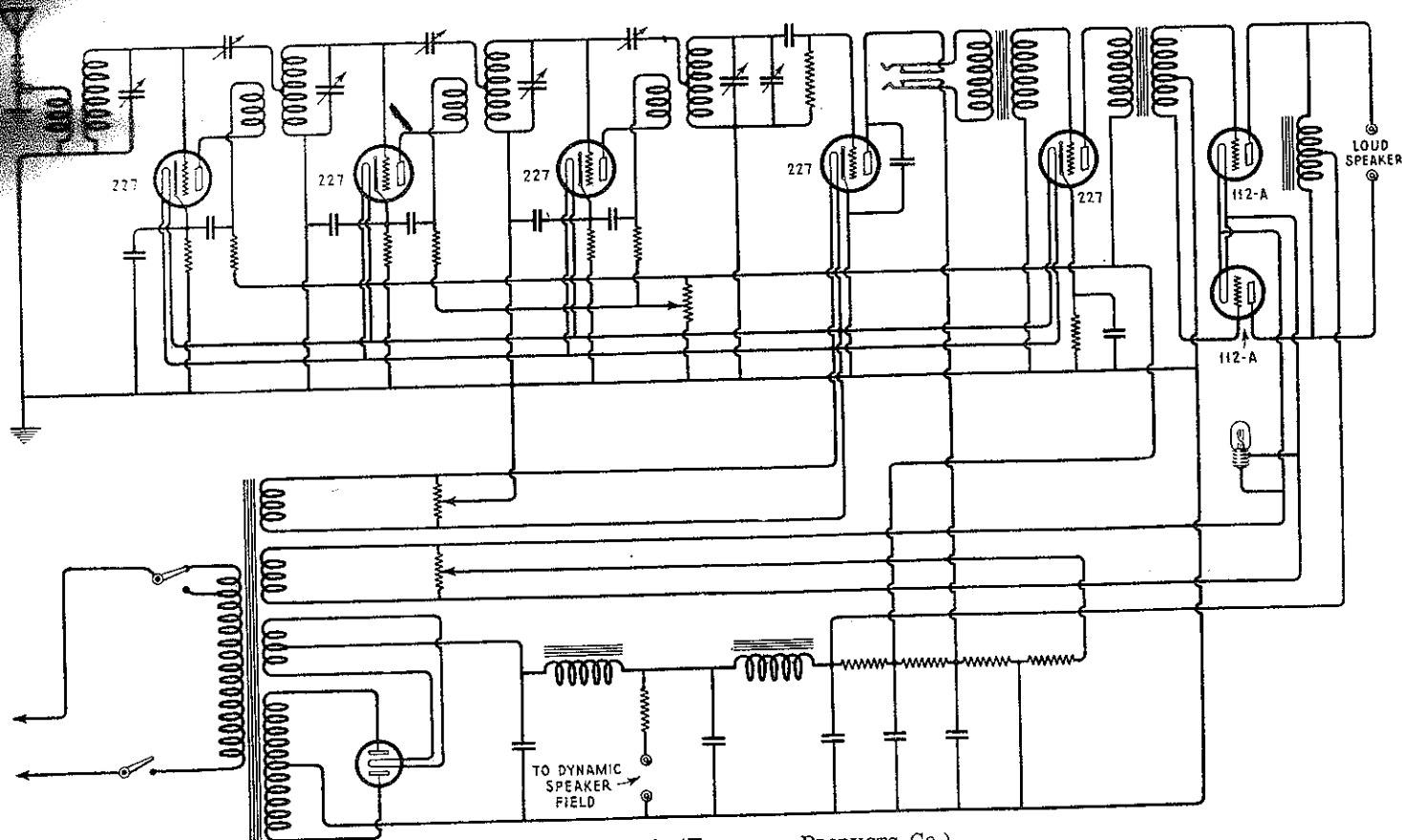
ATWATER KENT 32



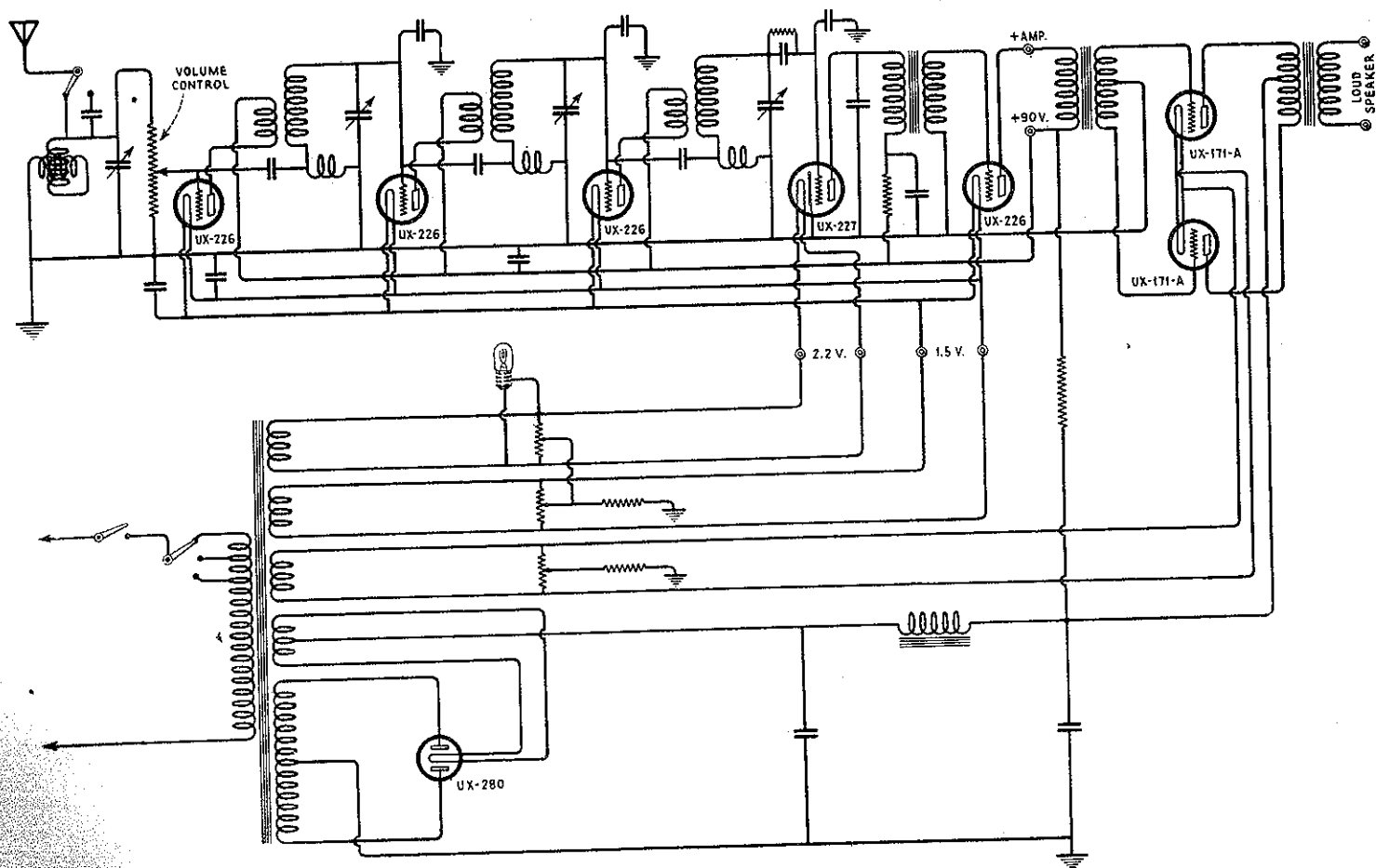
ATWATER KENT 35

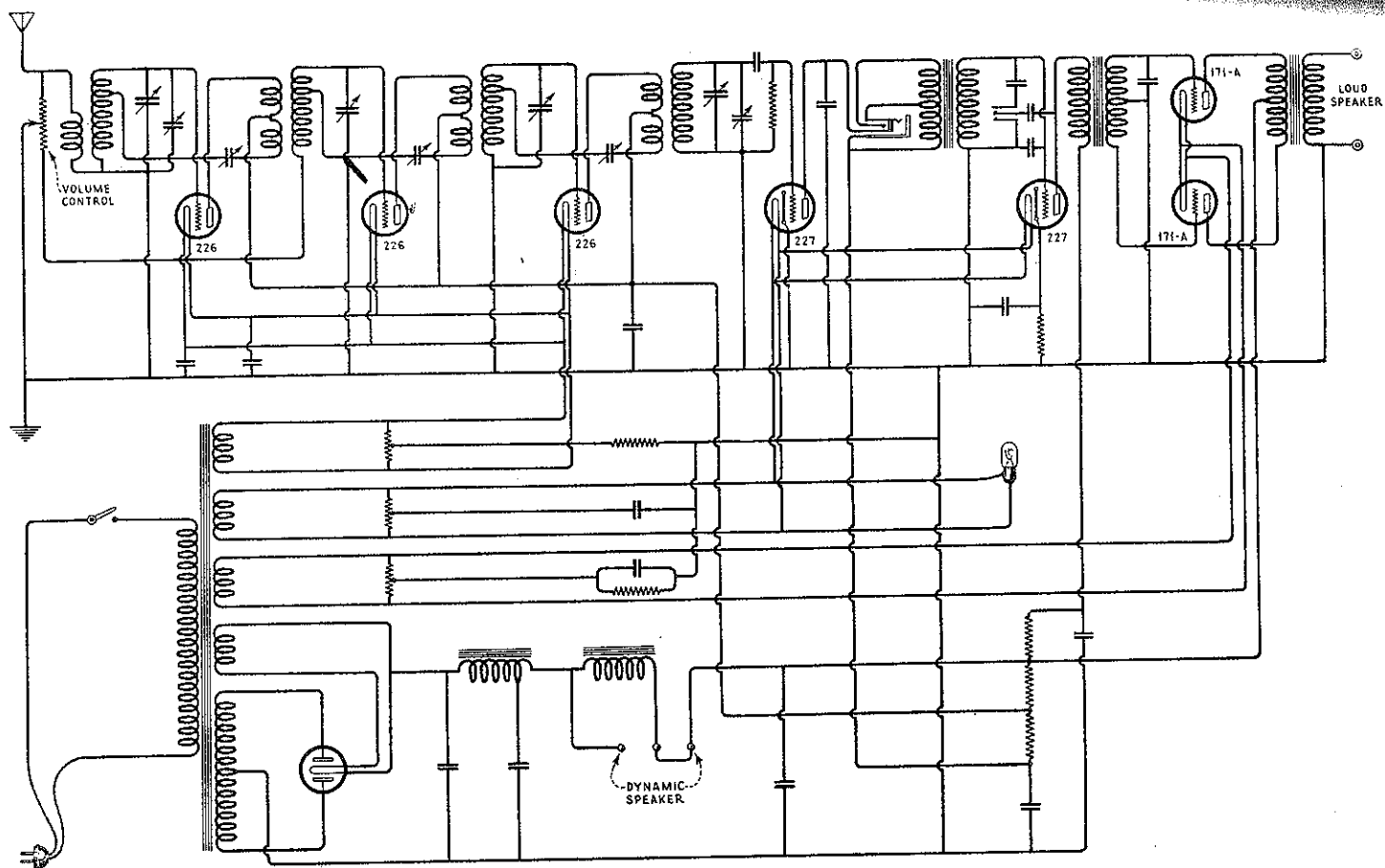


ATWATER KENT 40

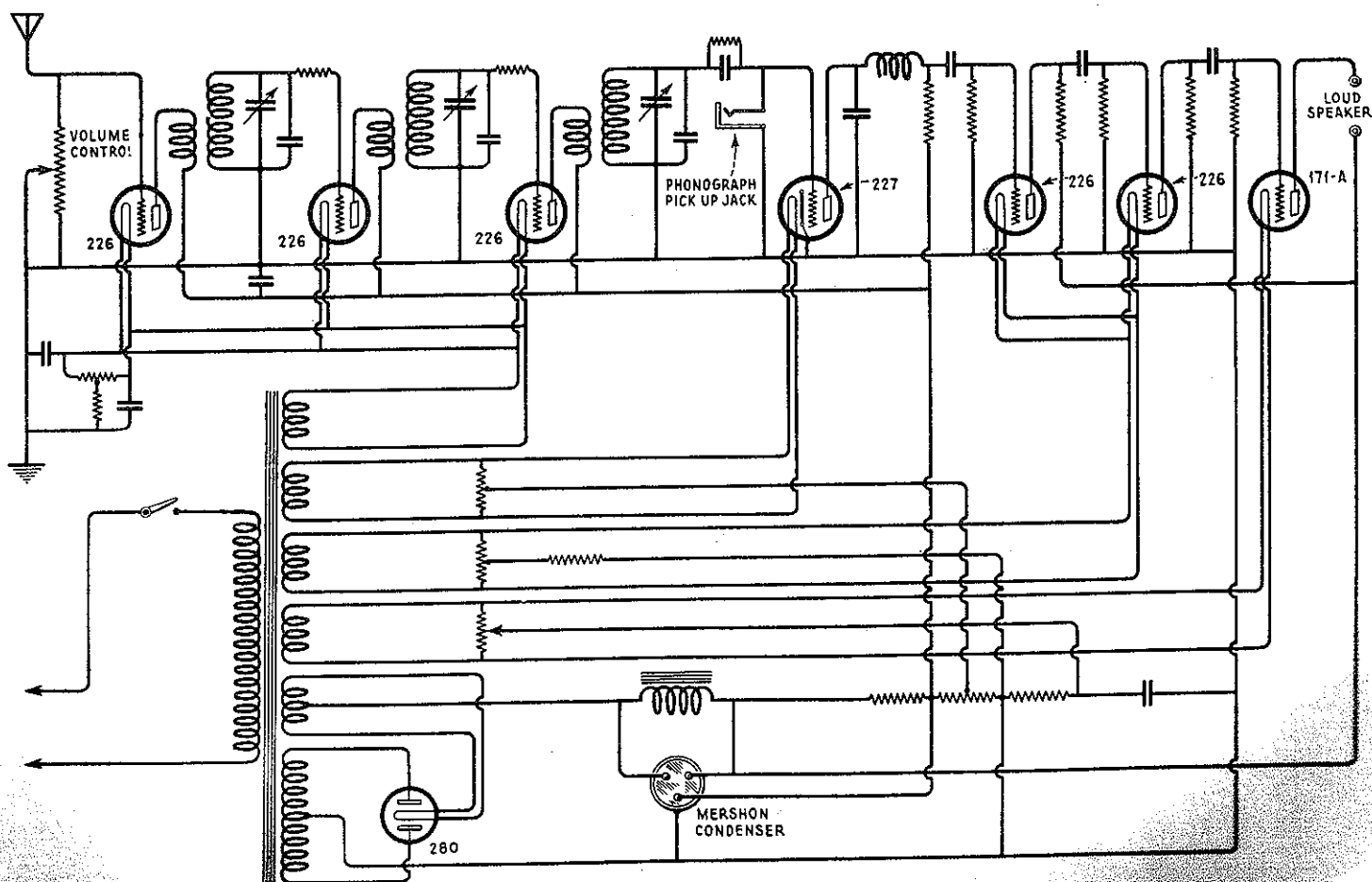


BALKITE—MODEL A (FANSTEEL PRODUCTS CO.)

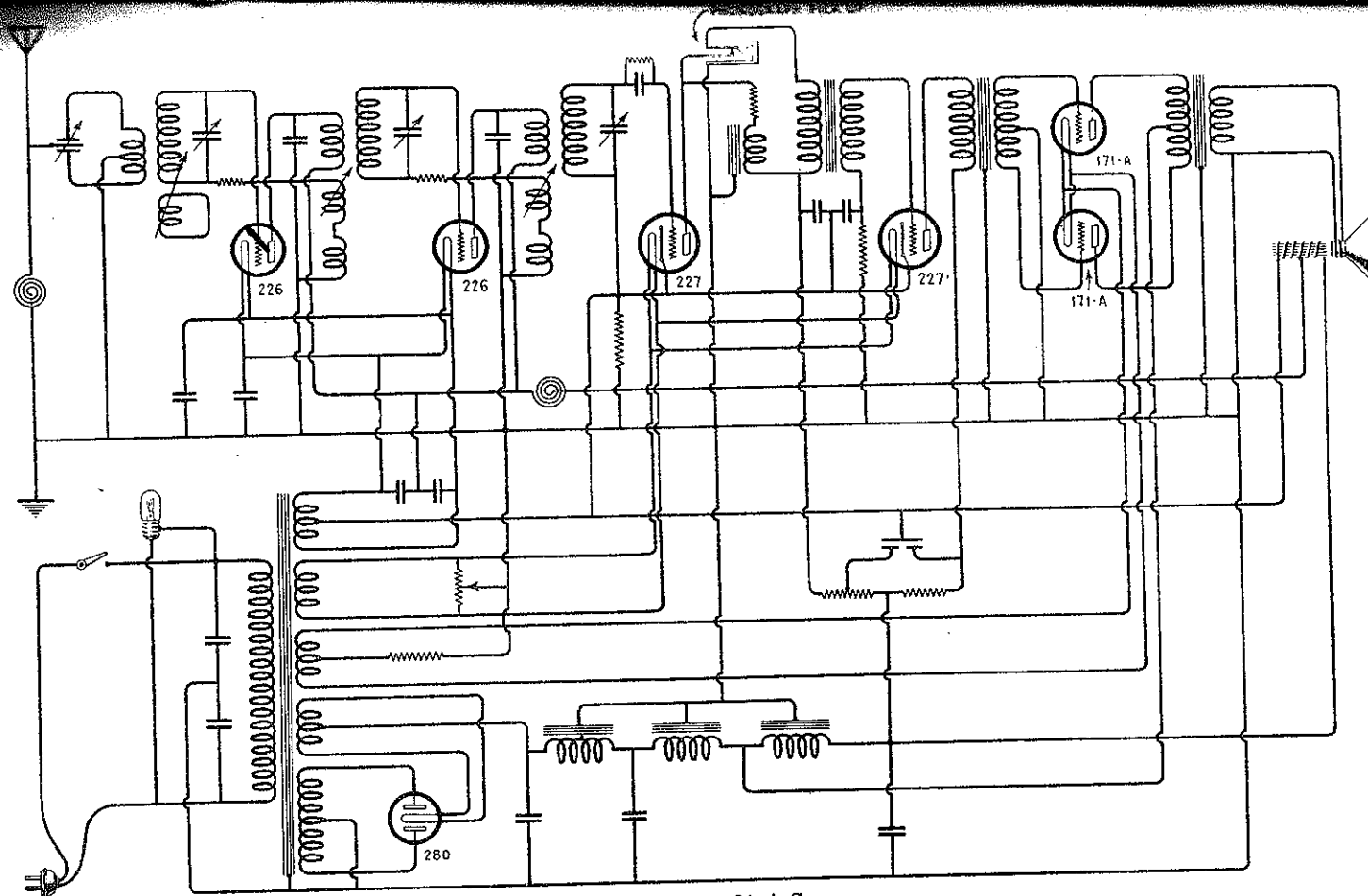




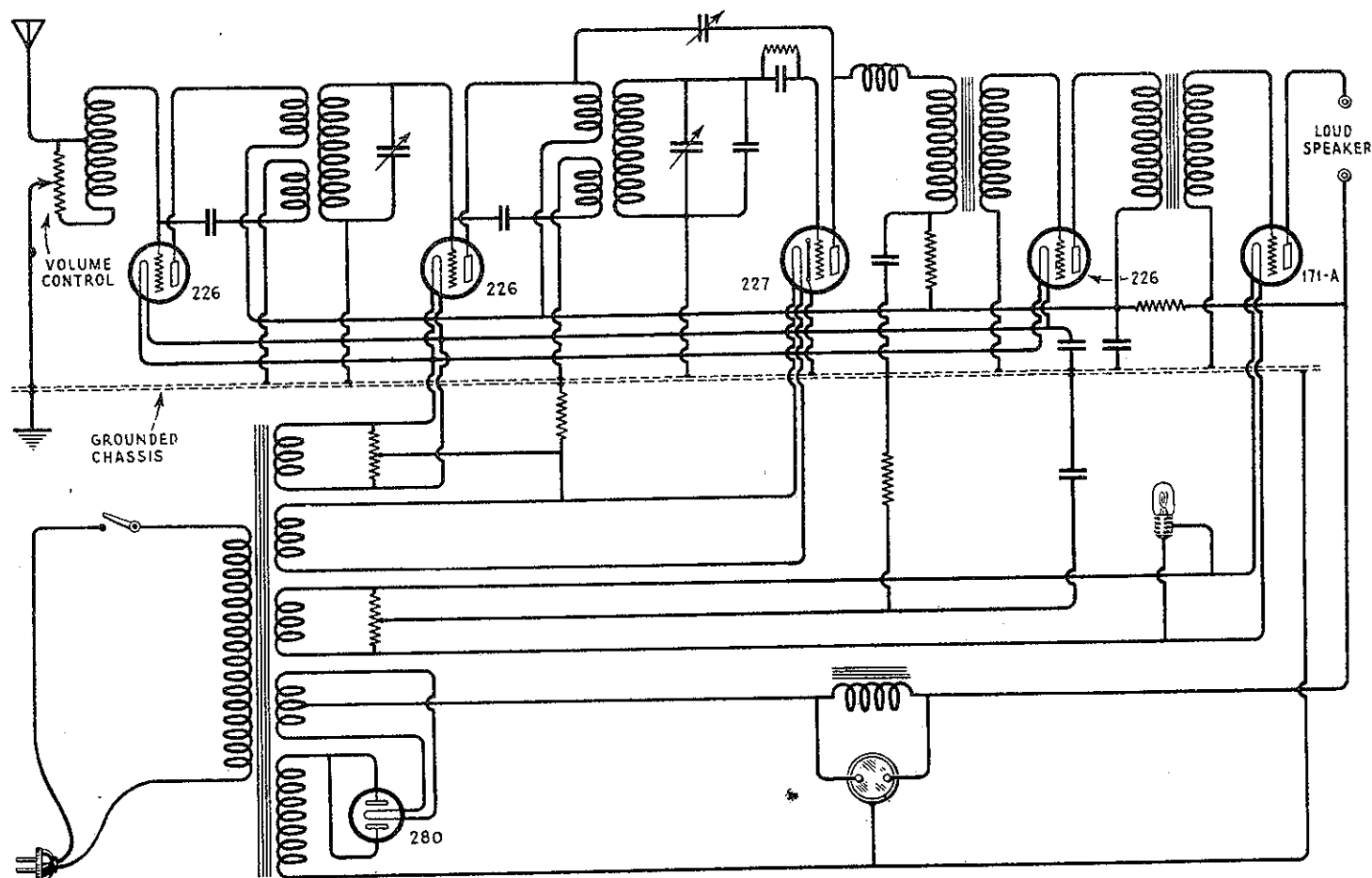
BREMER TULLY 7-70



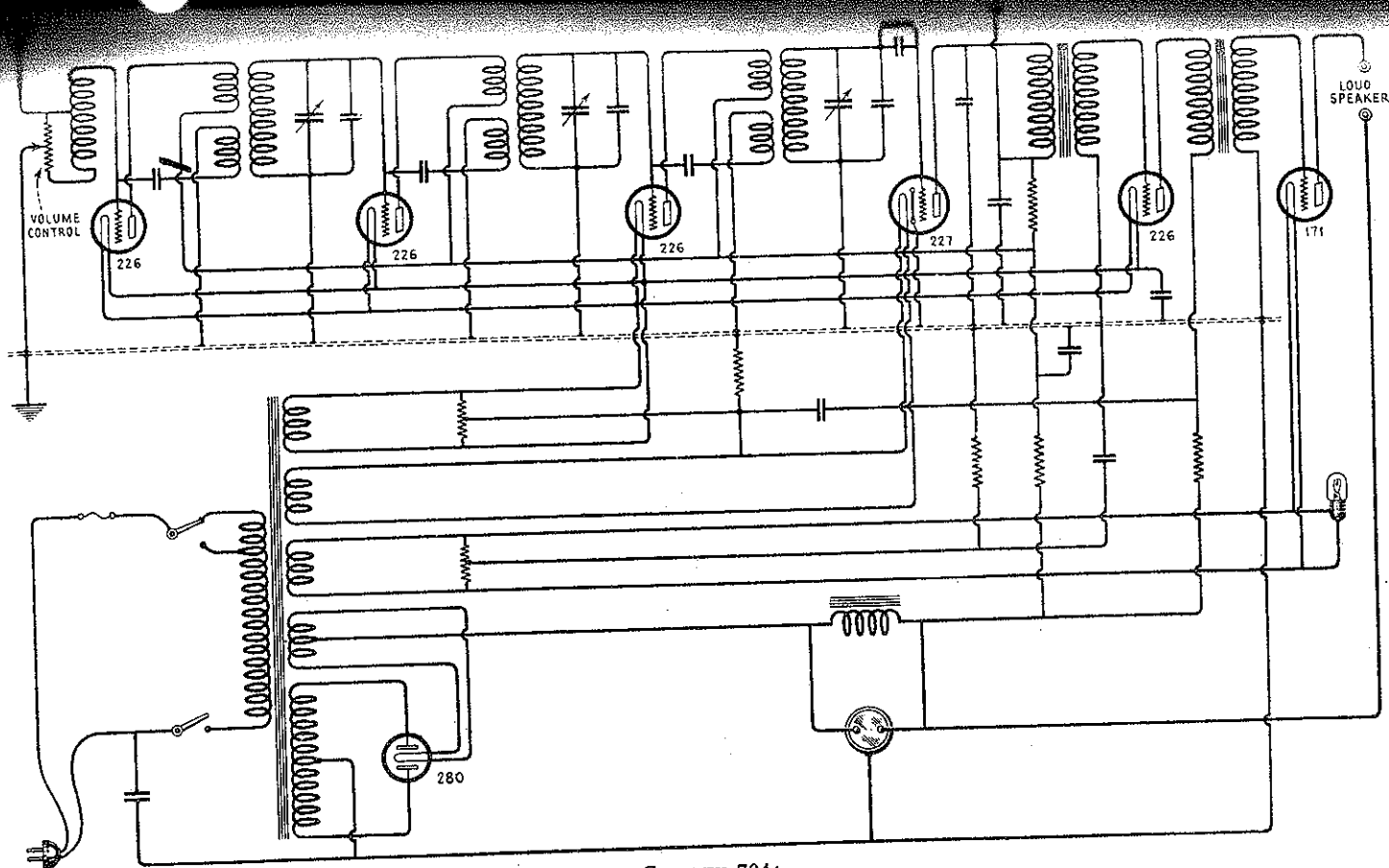
BROWNING DRAKE—MODELS 34, 36 AND 38



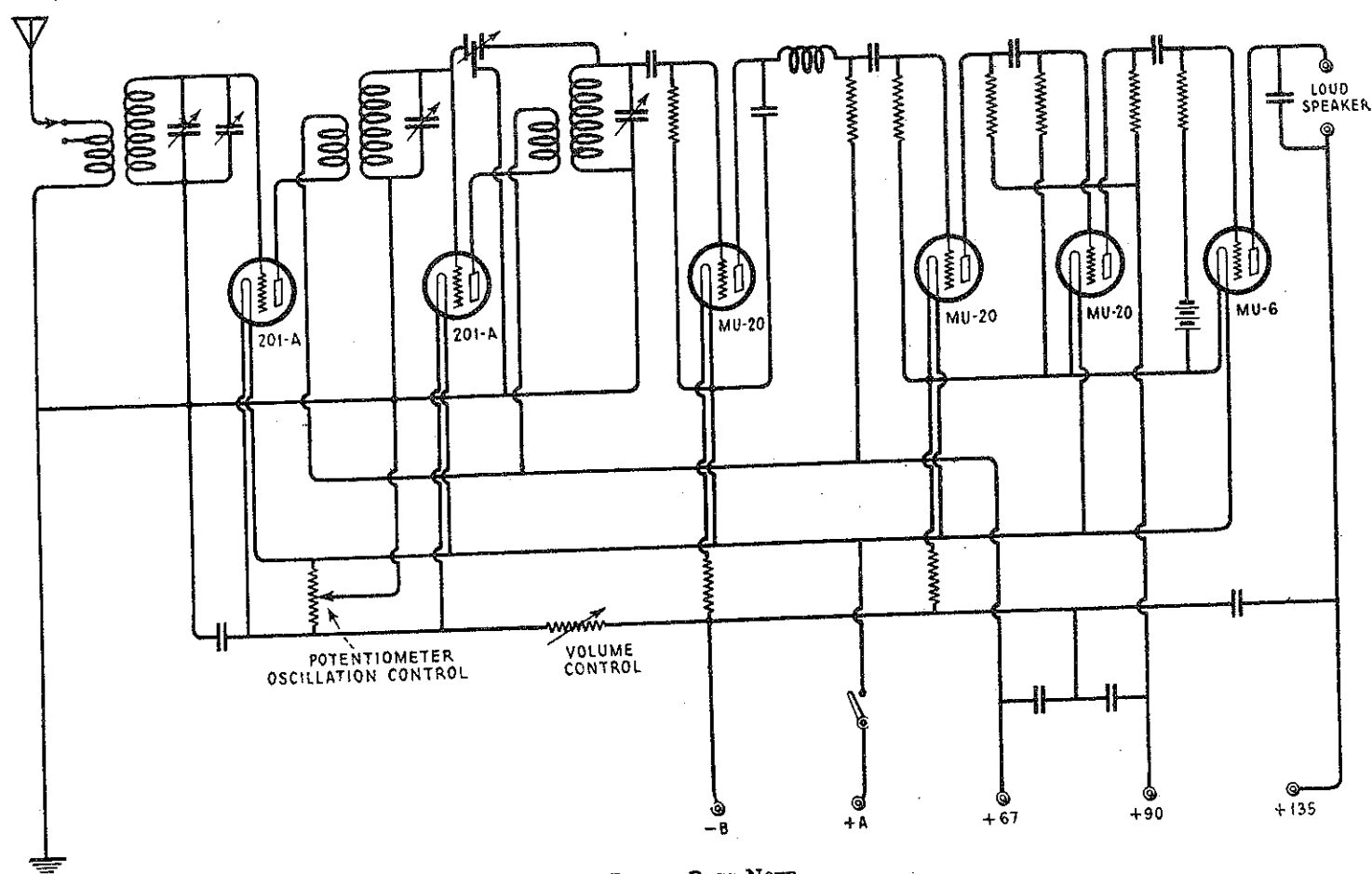
COLONIAL 31 A.C.



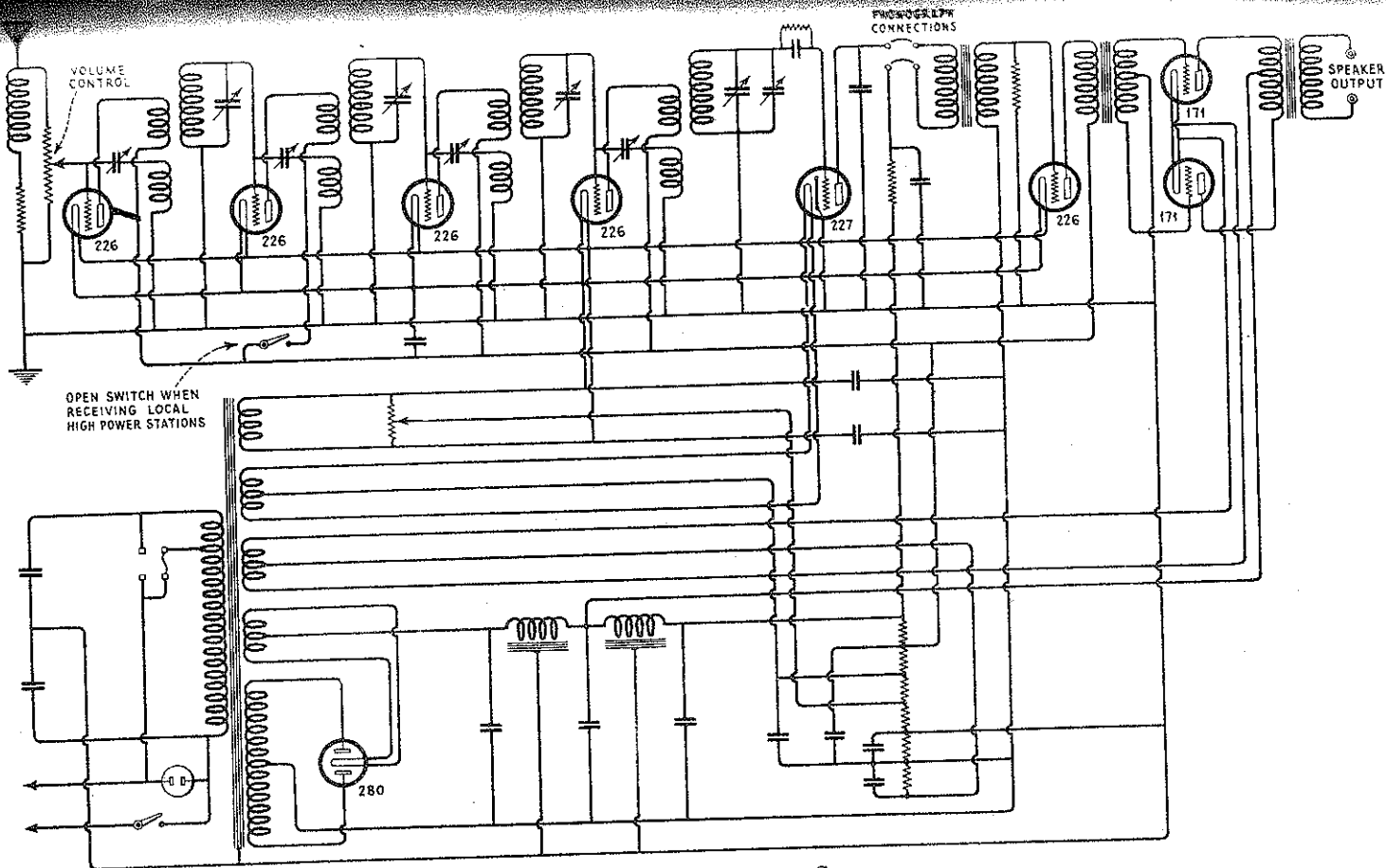
CROSLY 608



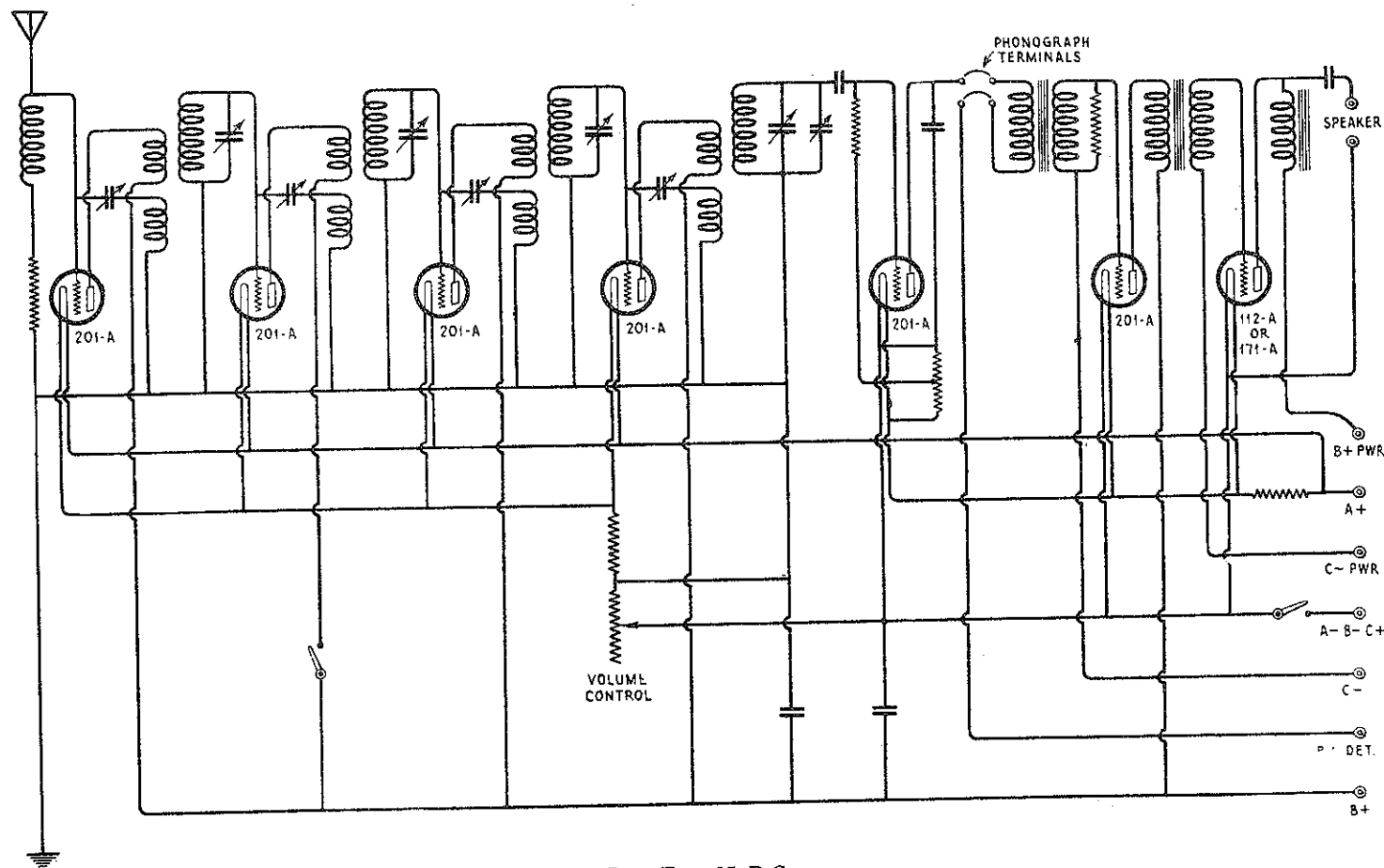
CROSLY 704A



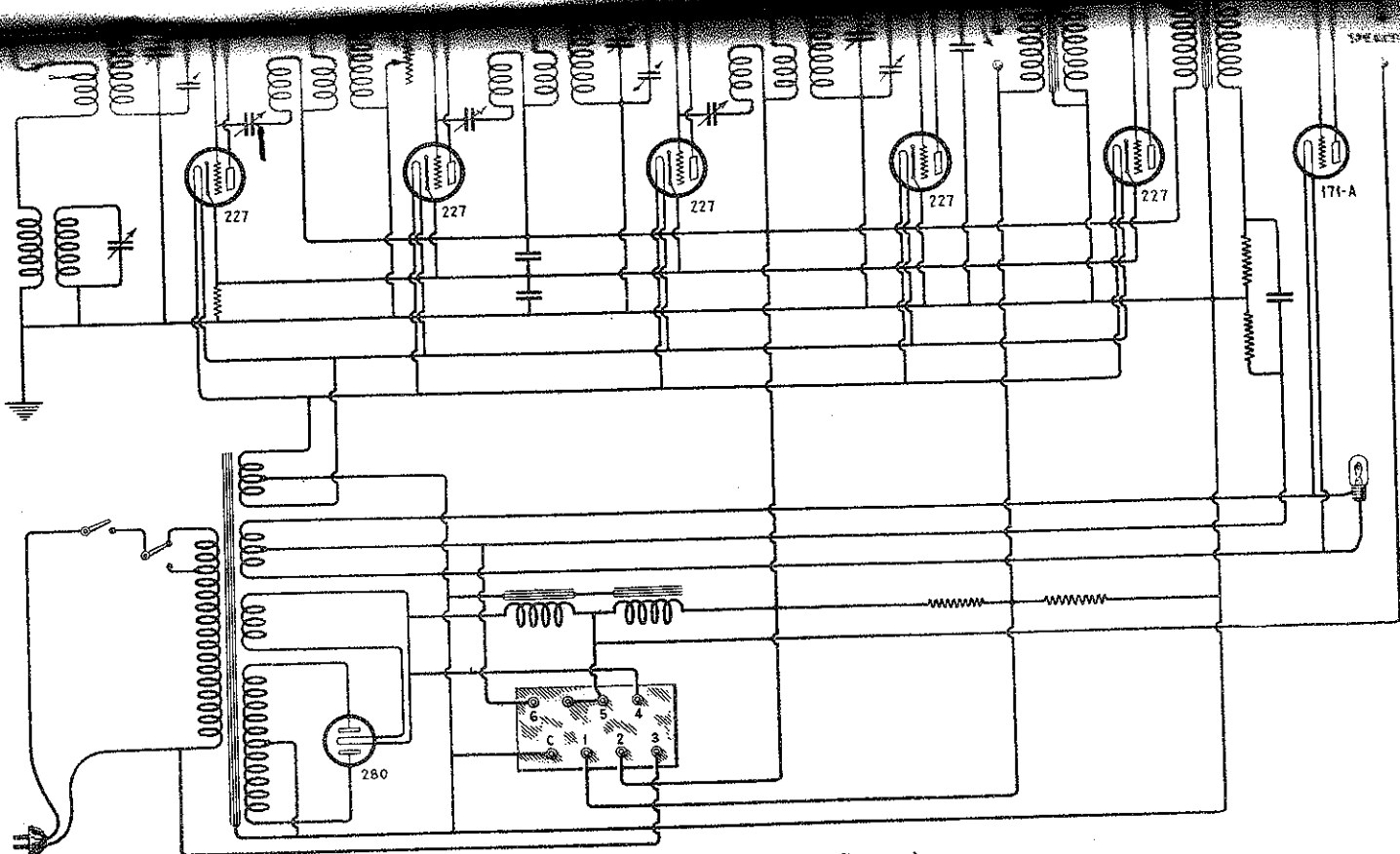
DAVEN BASS NOTE



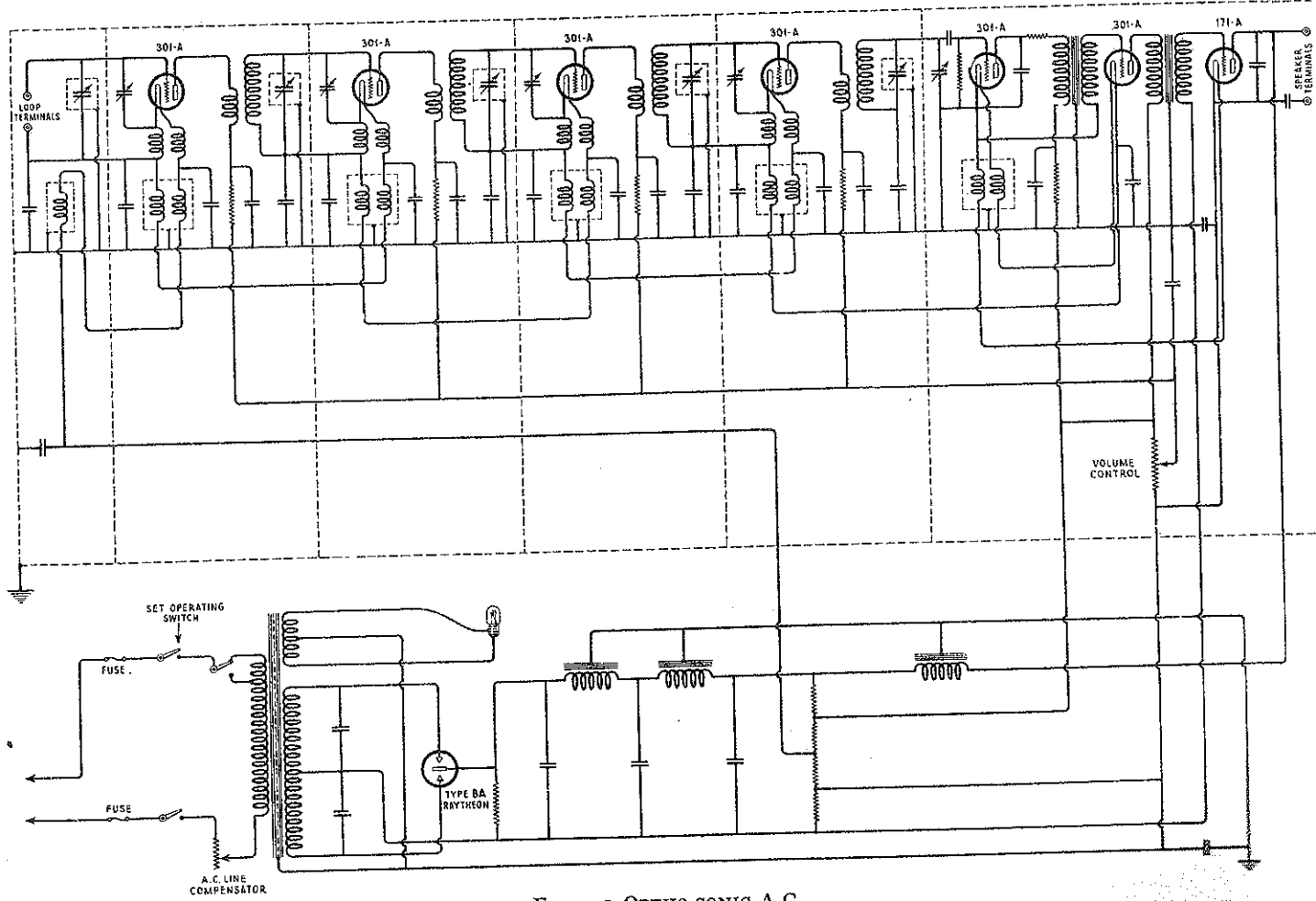
DAY FAN A.C. POWER SET

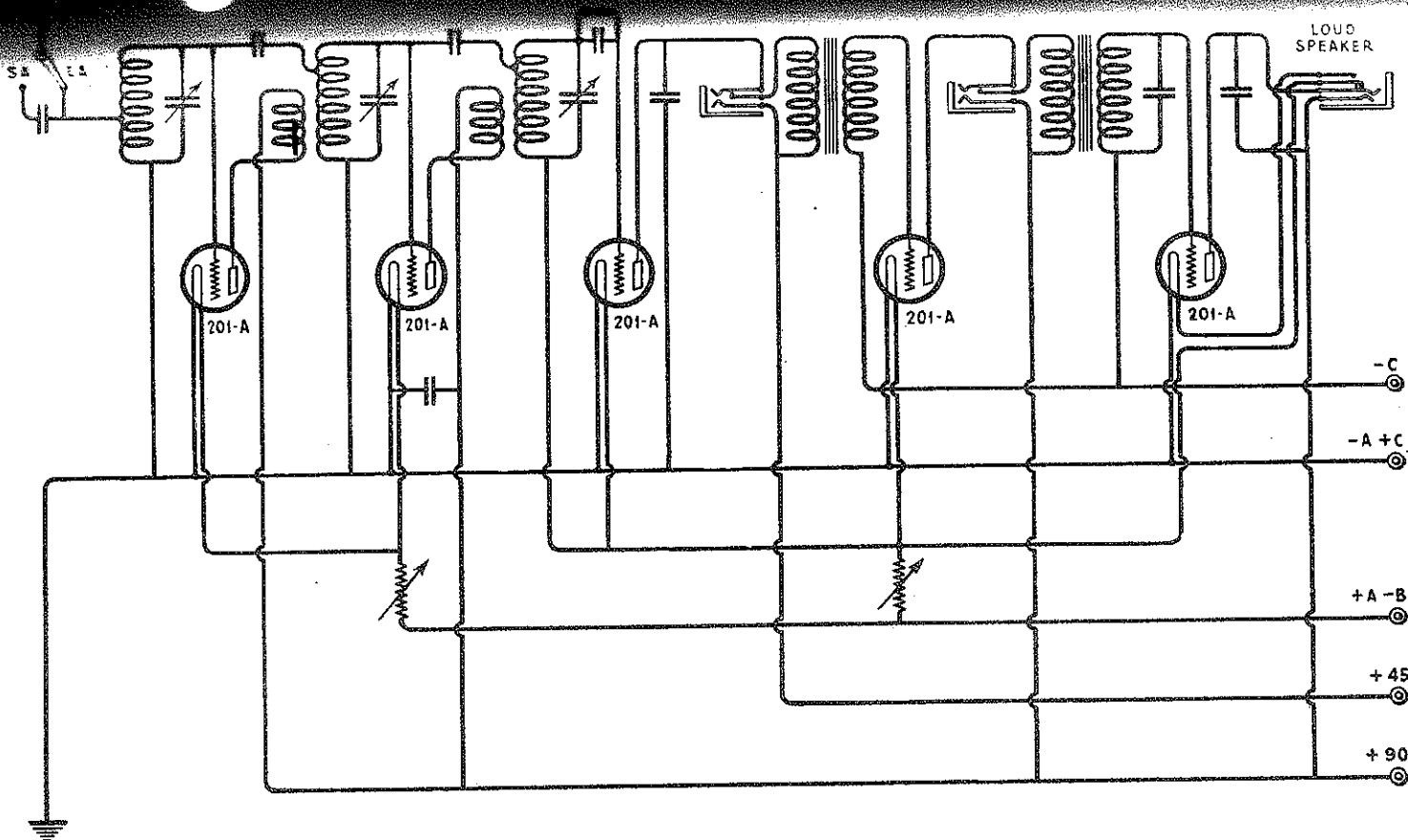


DAY FAN 35 D.C.

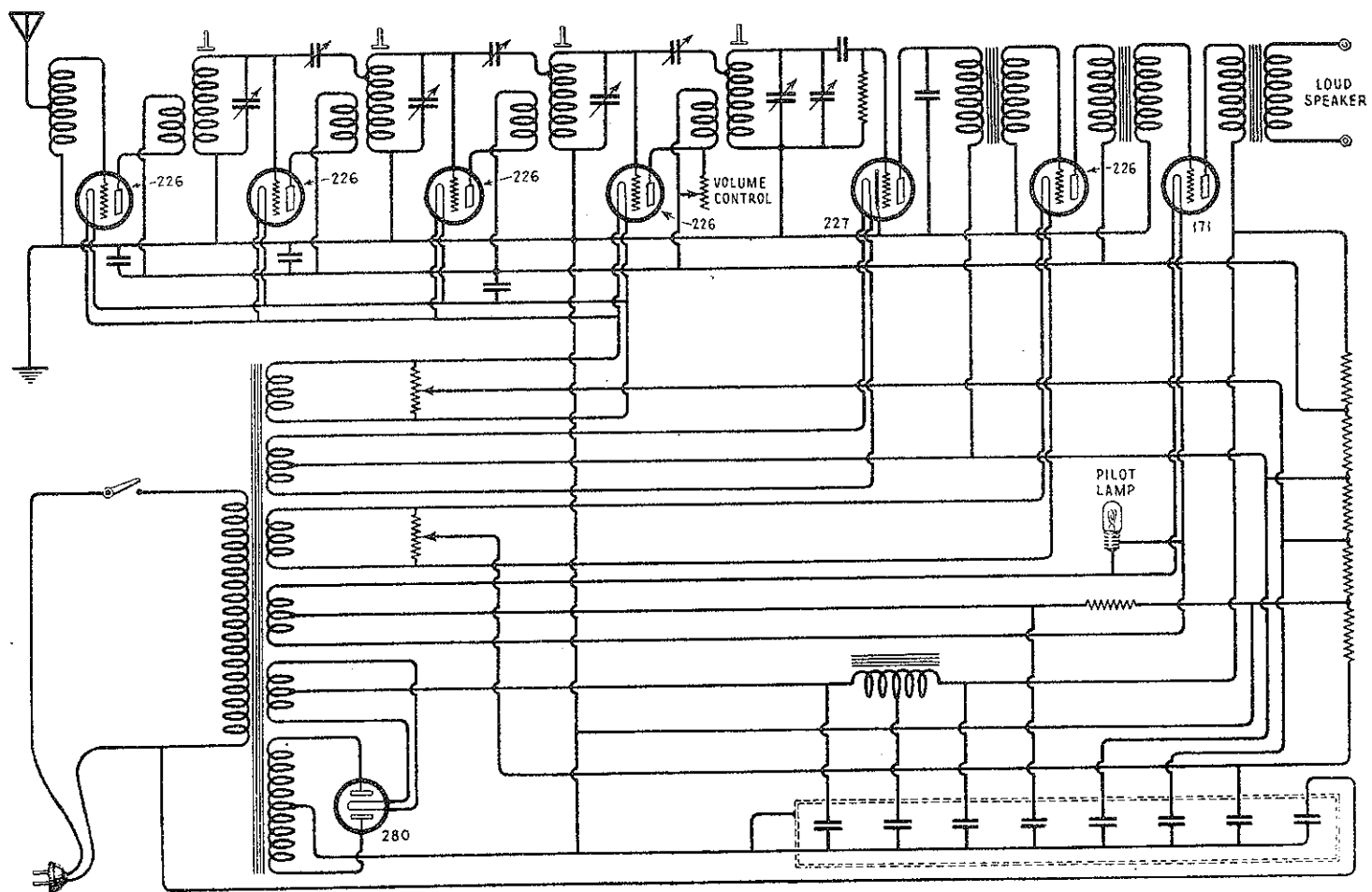


FADA—MODELS 10, 11, 30 AND 31 (60 CYCLES)
MODELS 10Z, 11Z, 30Z AND 31Z (25 CYCLES)

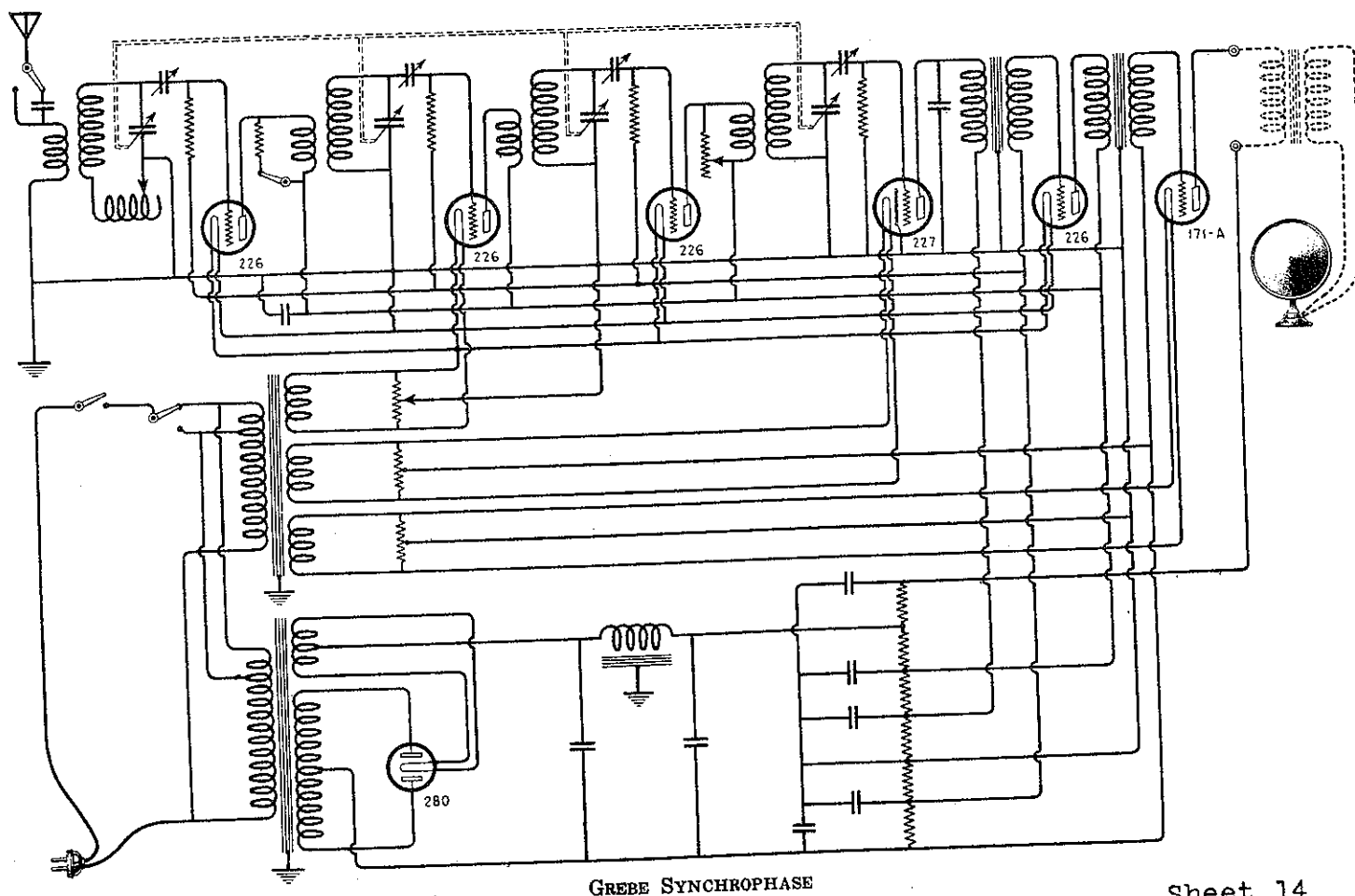
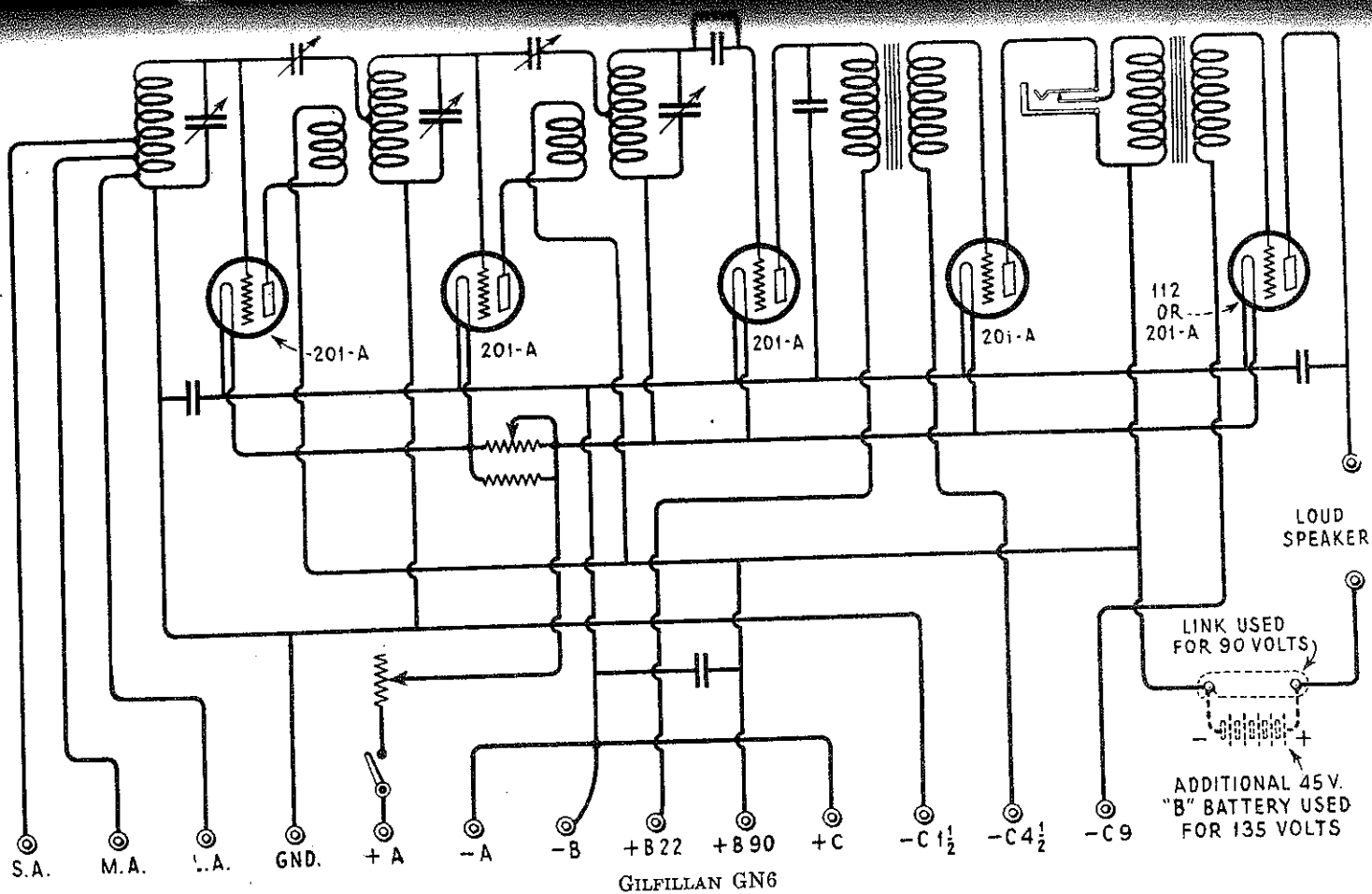


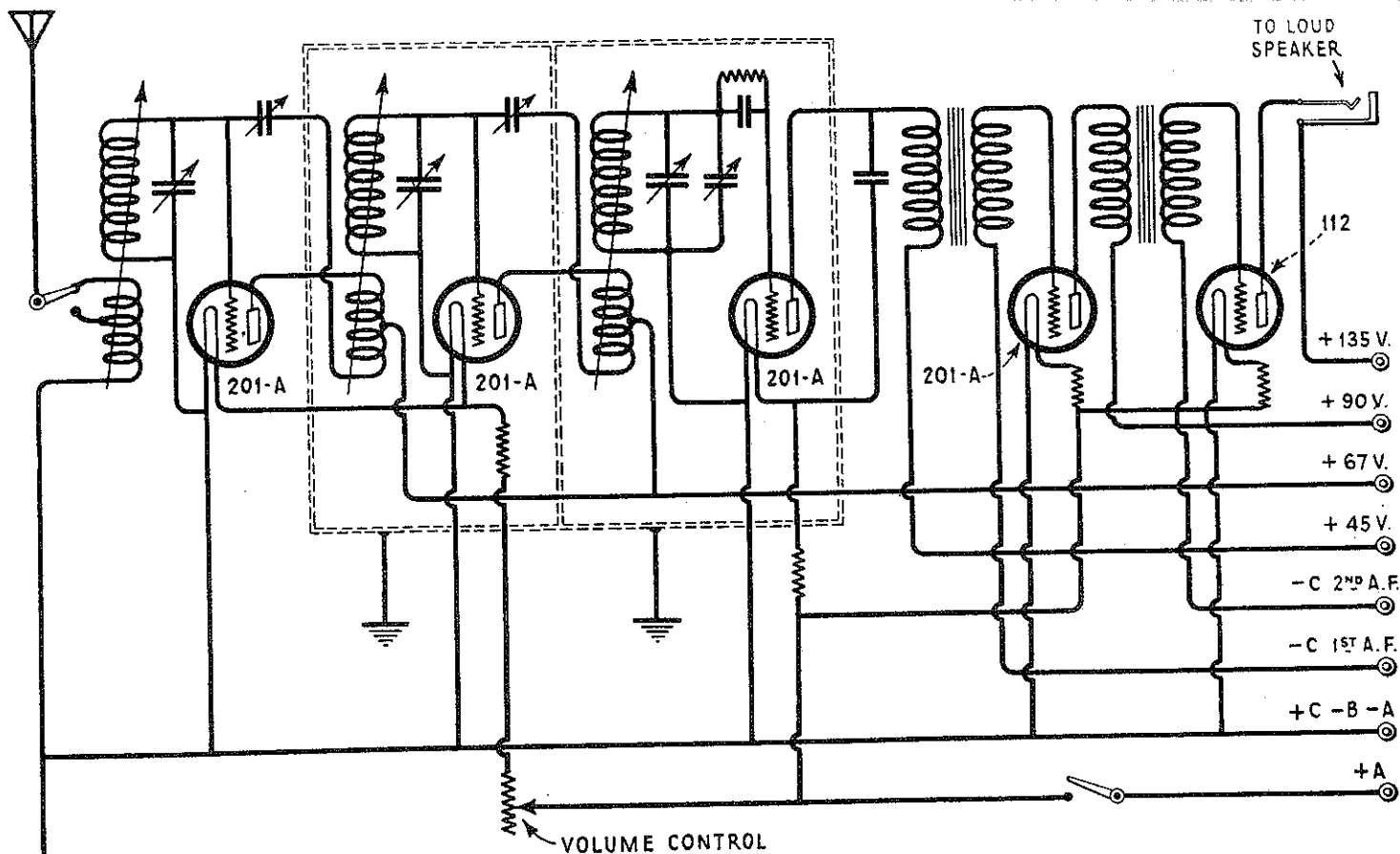


FREED EISEMANN NR5

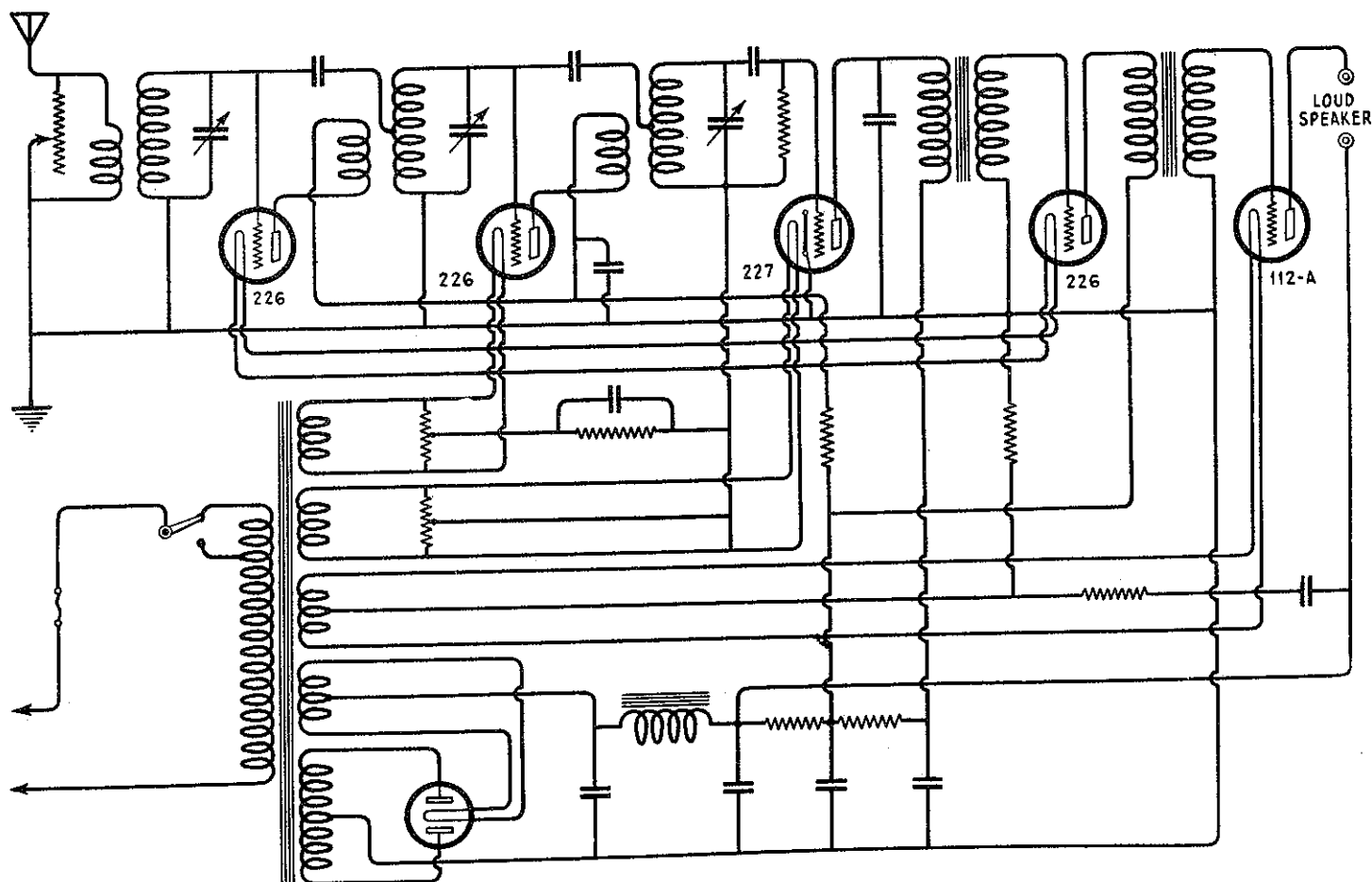


FREED EISEMANN NR80

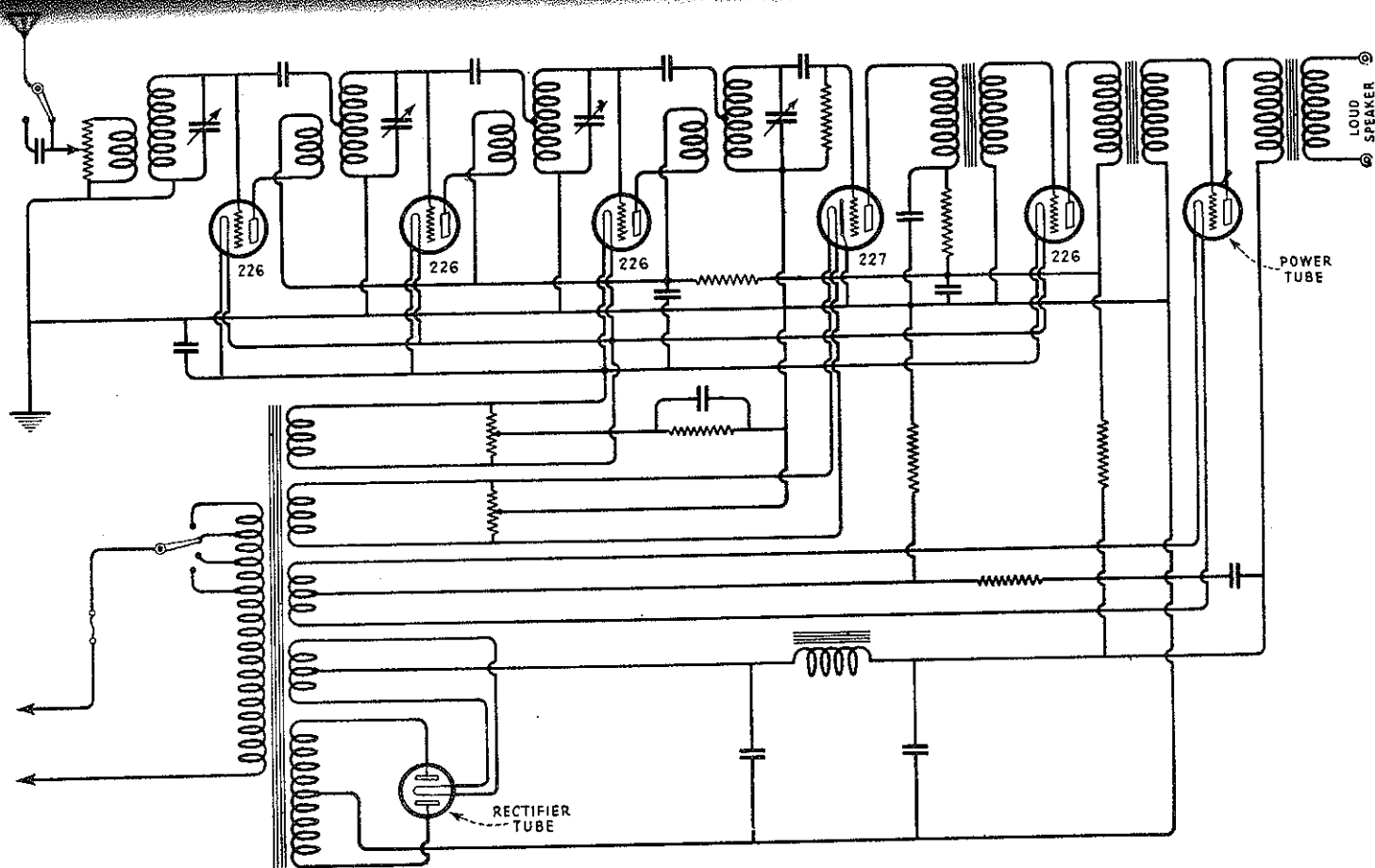




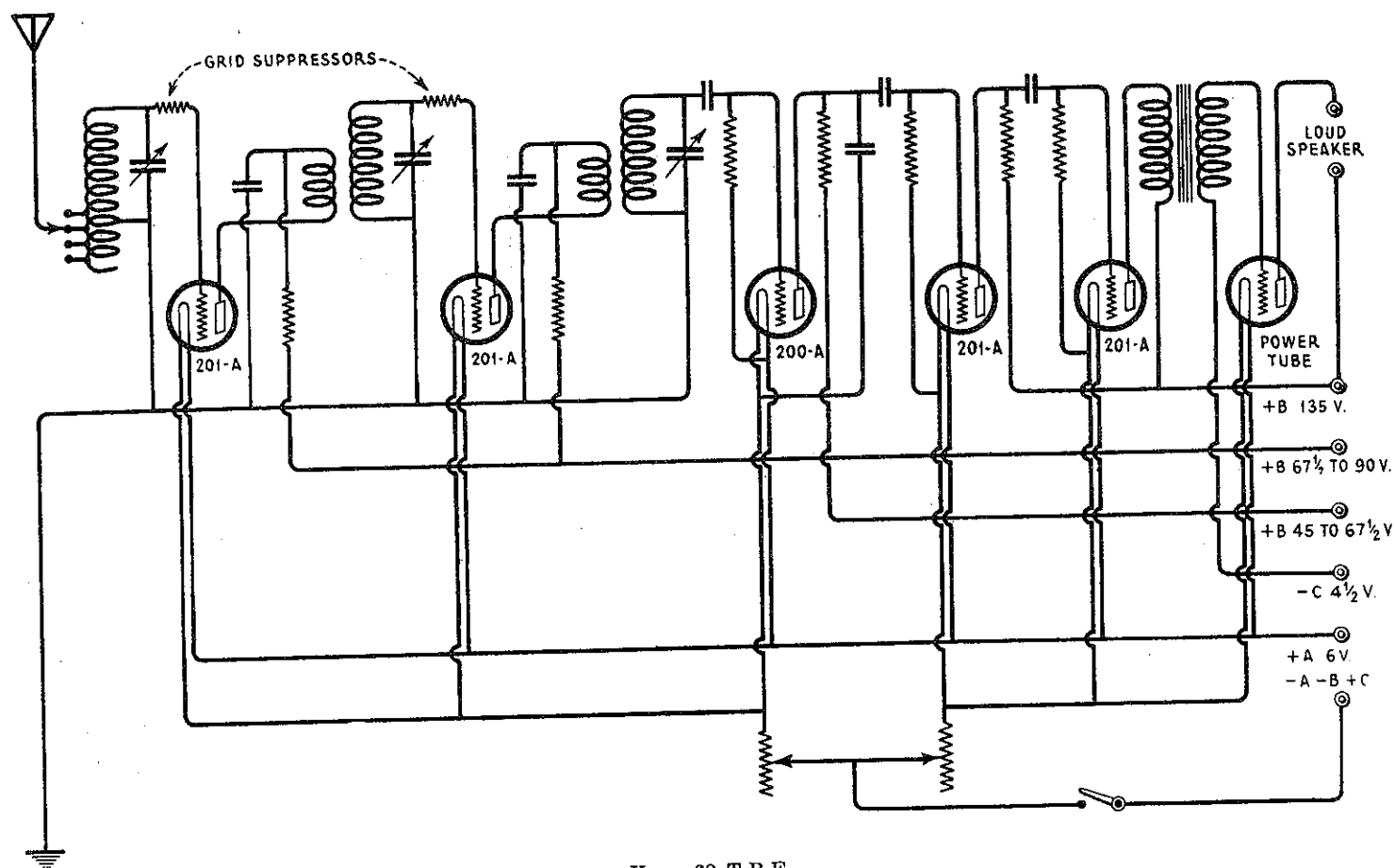
HAMMERLUND ROBERTS HI-Q



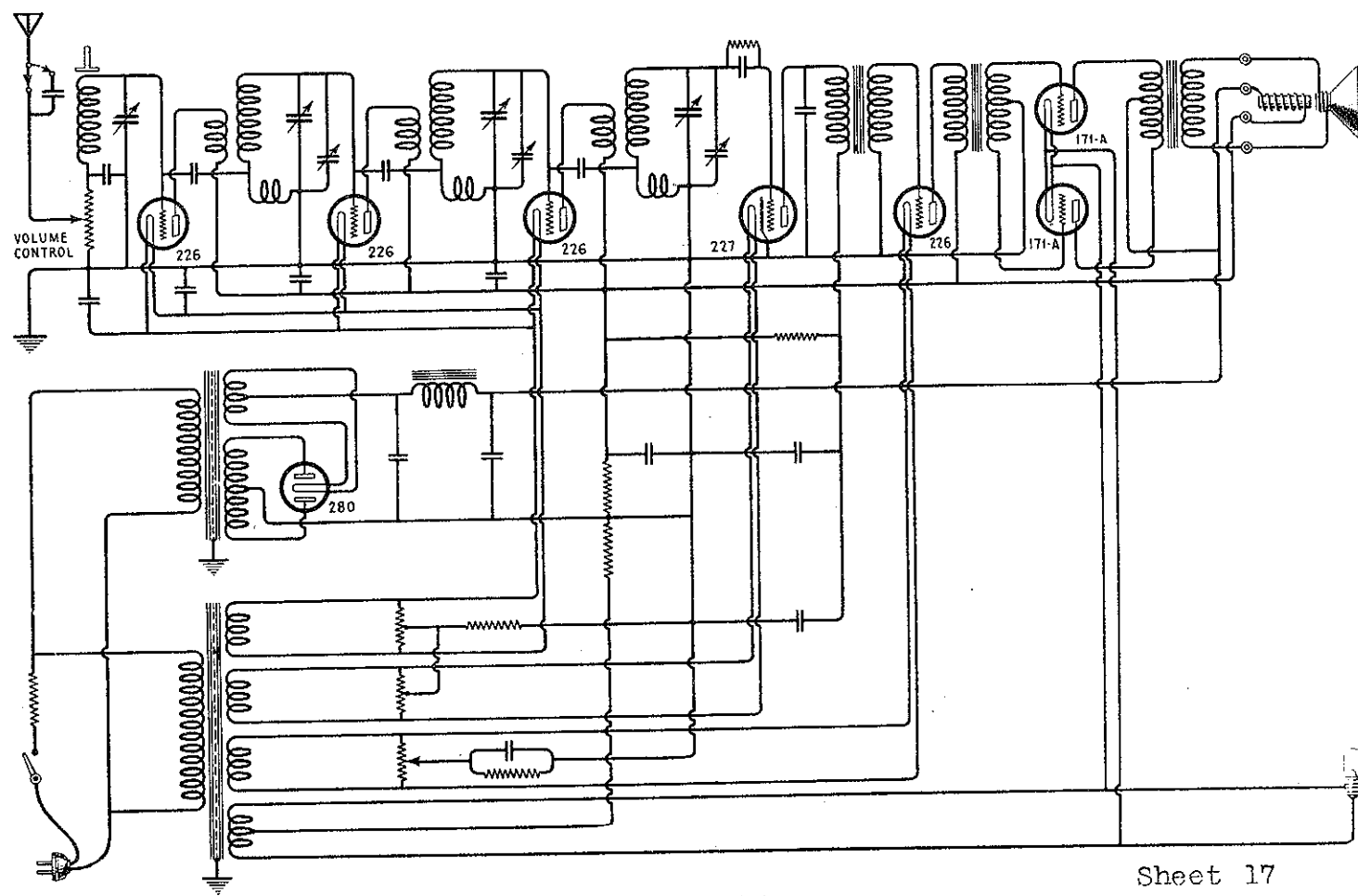
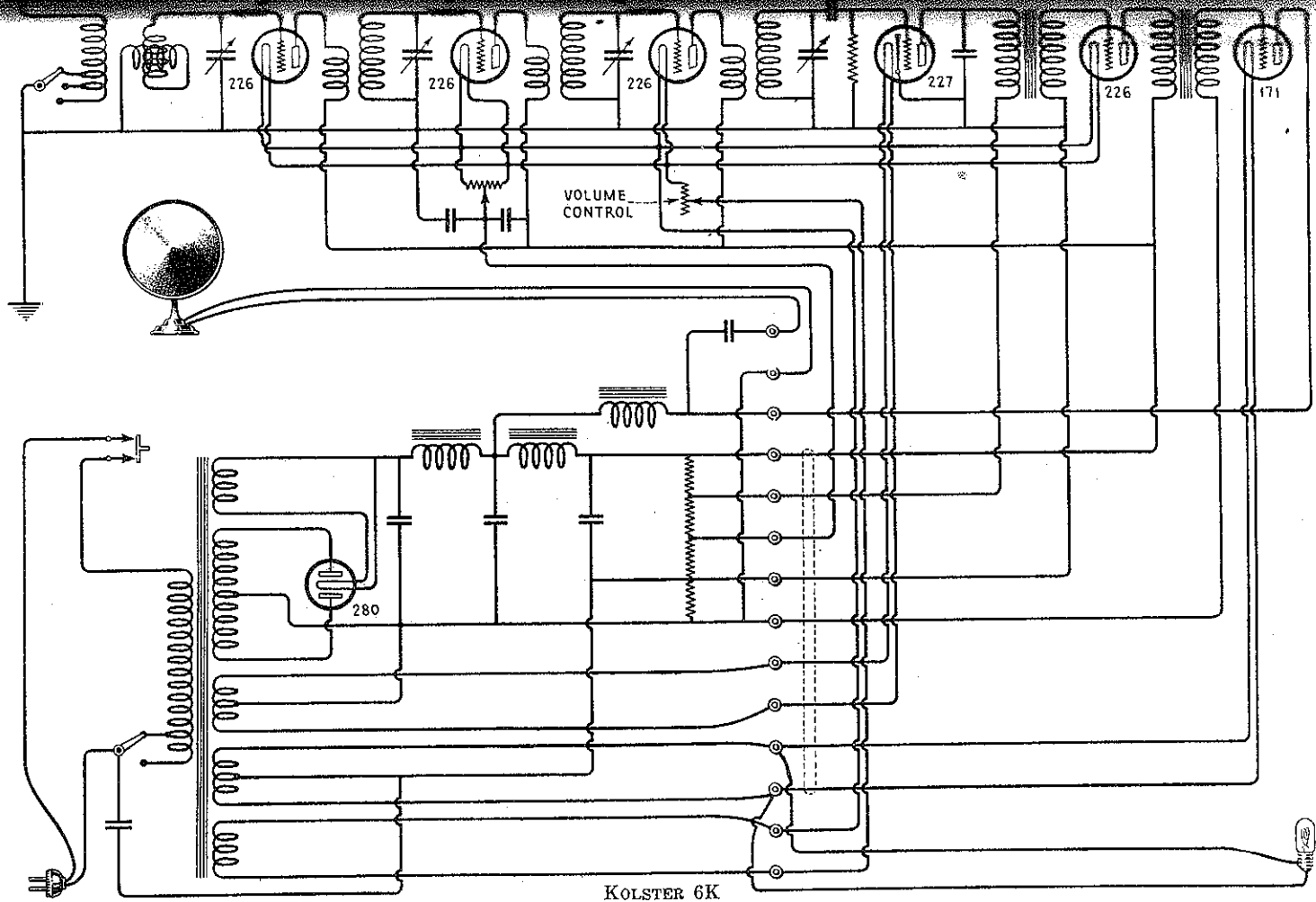
KING—MODEL FF

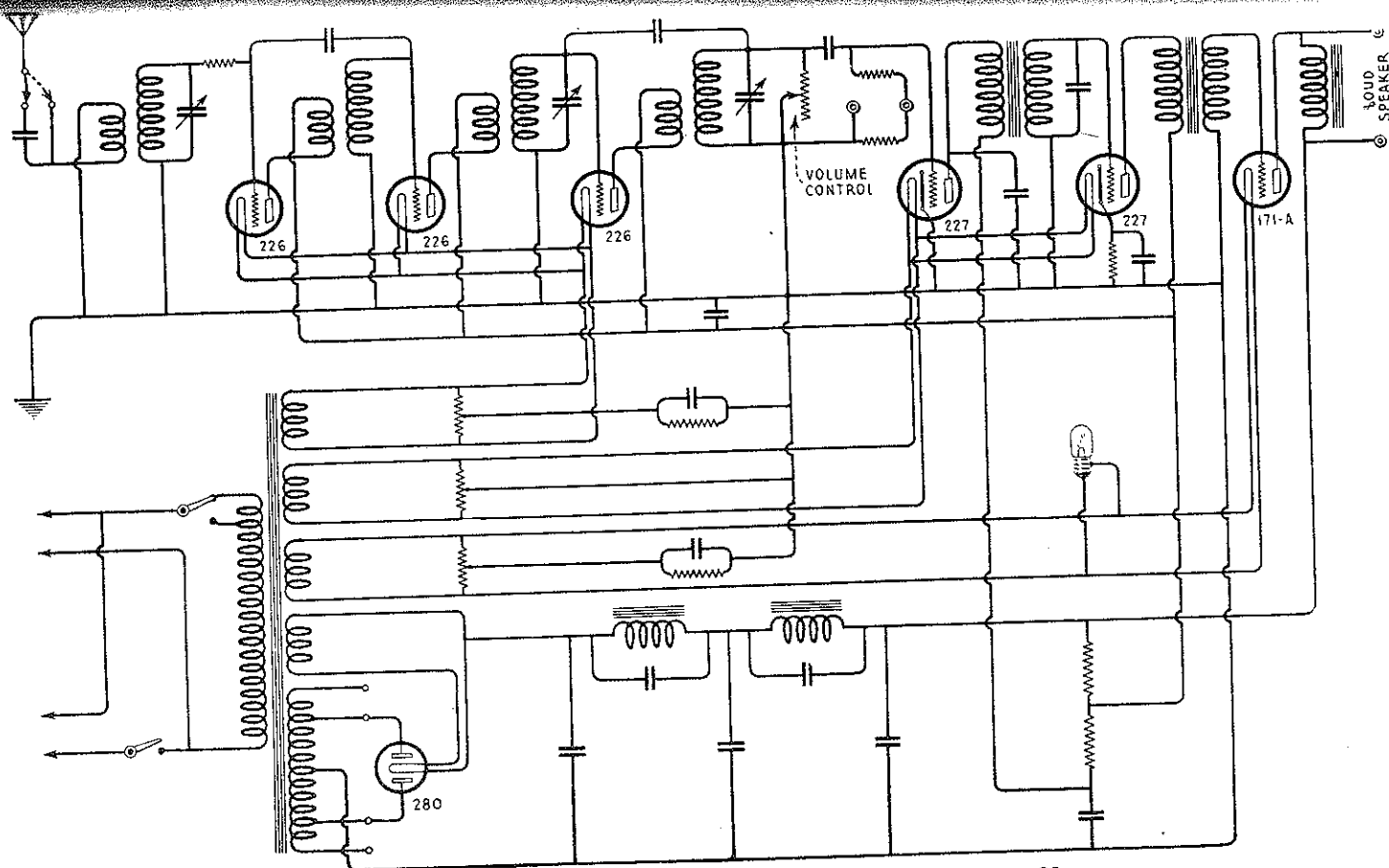


KING—MODEL H

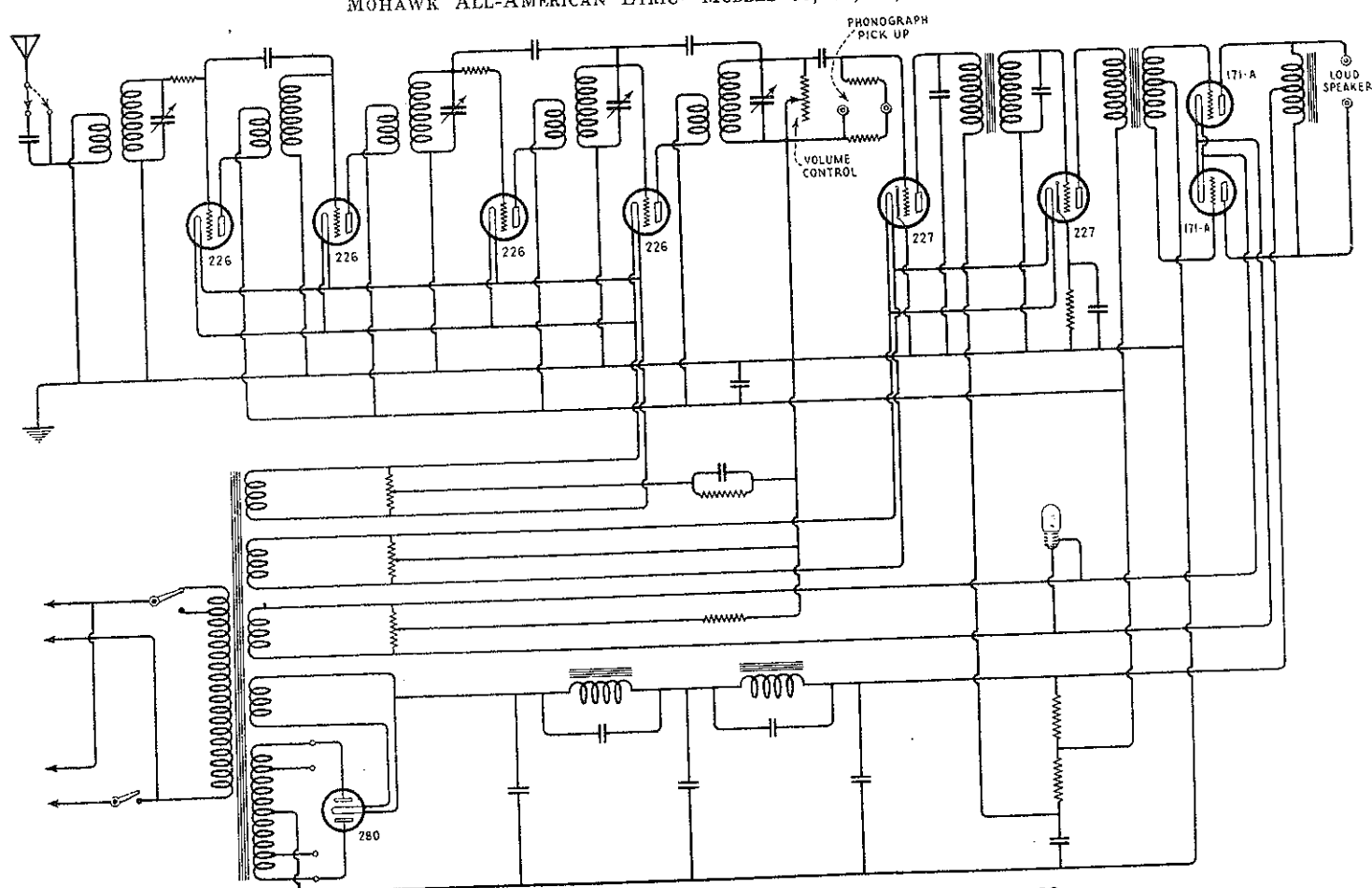


KING 62 T.R.F.

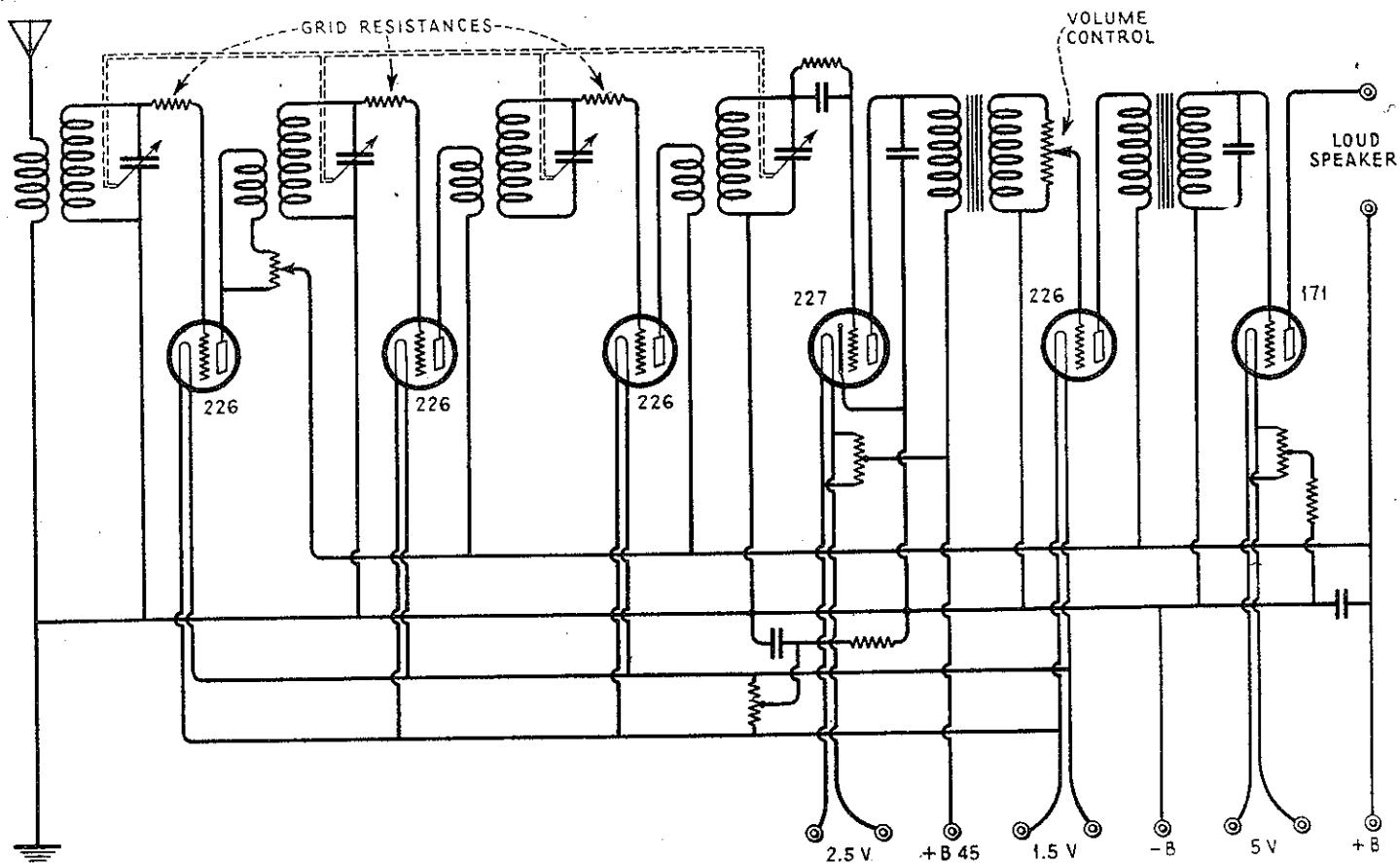




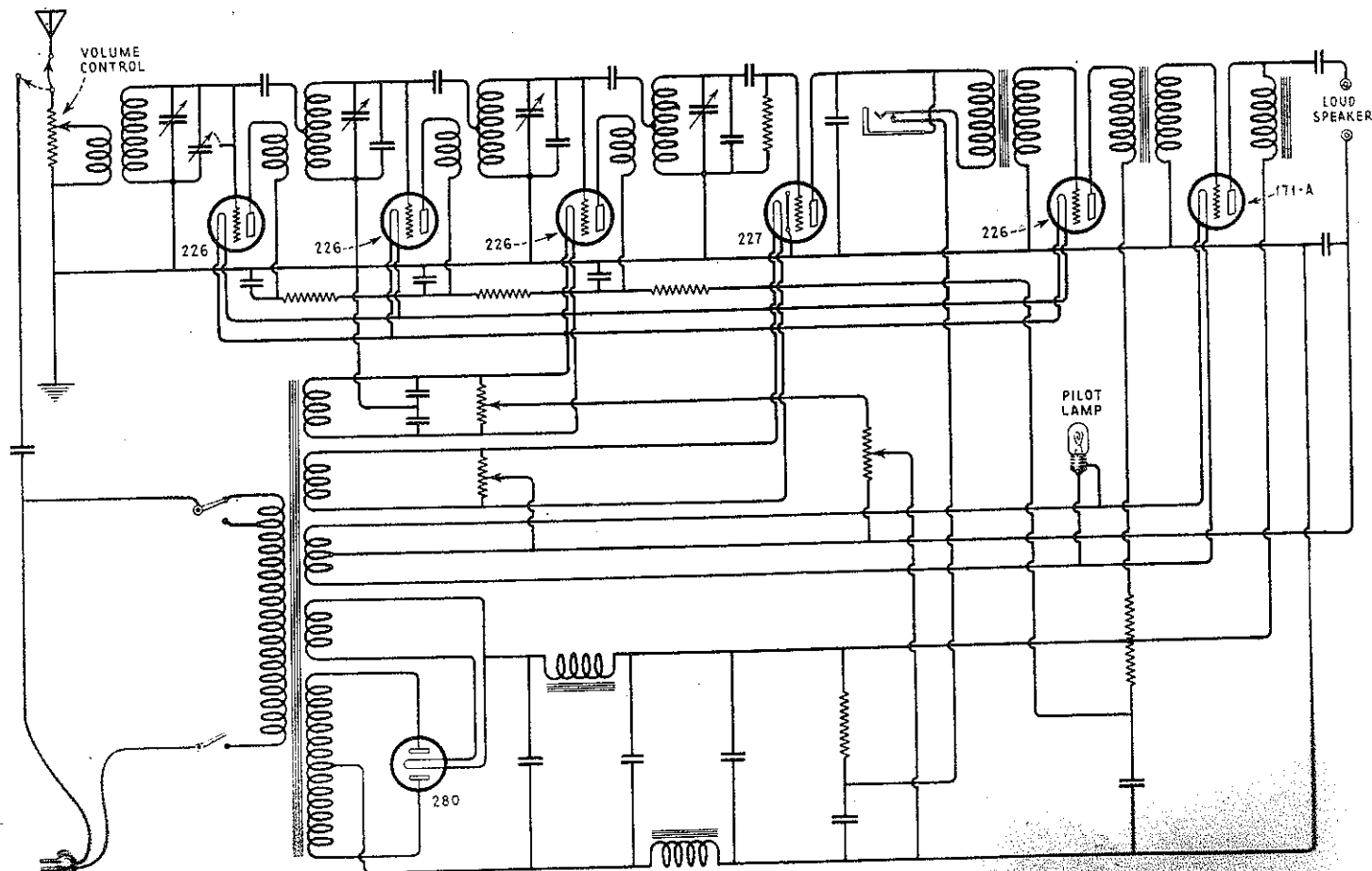
MOHAWK ALL-AMERICAN LYRIC—MODELS 60, 61, 62, 65 AND 66



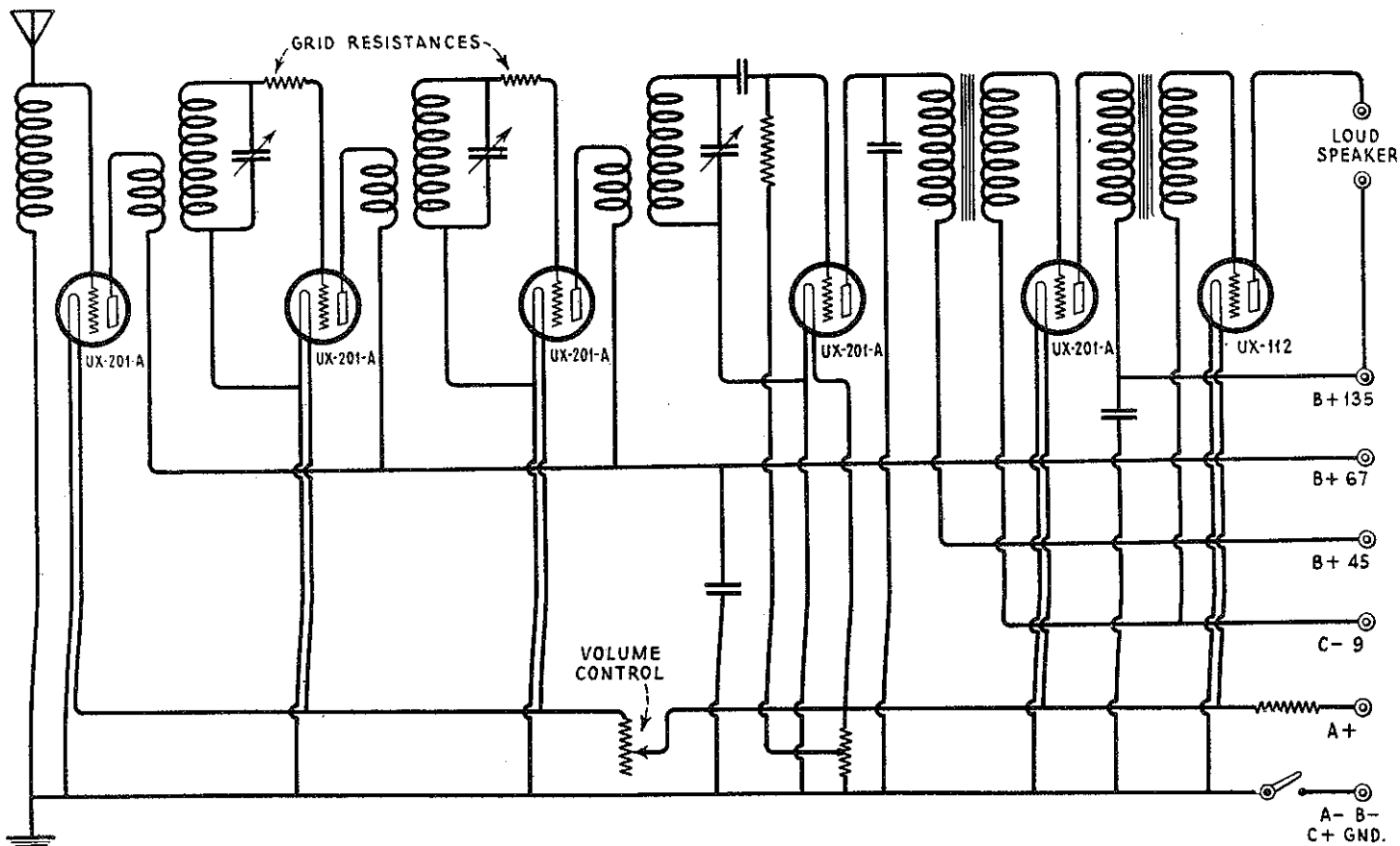
MOHAWK ALL-AMERICAN LYRIC—MODELS 80, 83, 84, 85, 86 AND 88



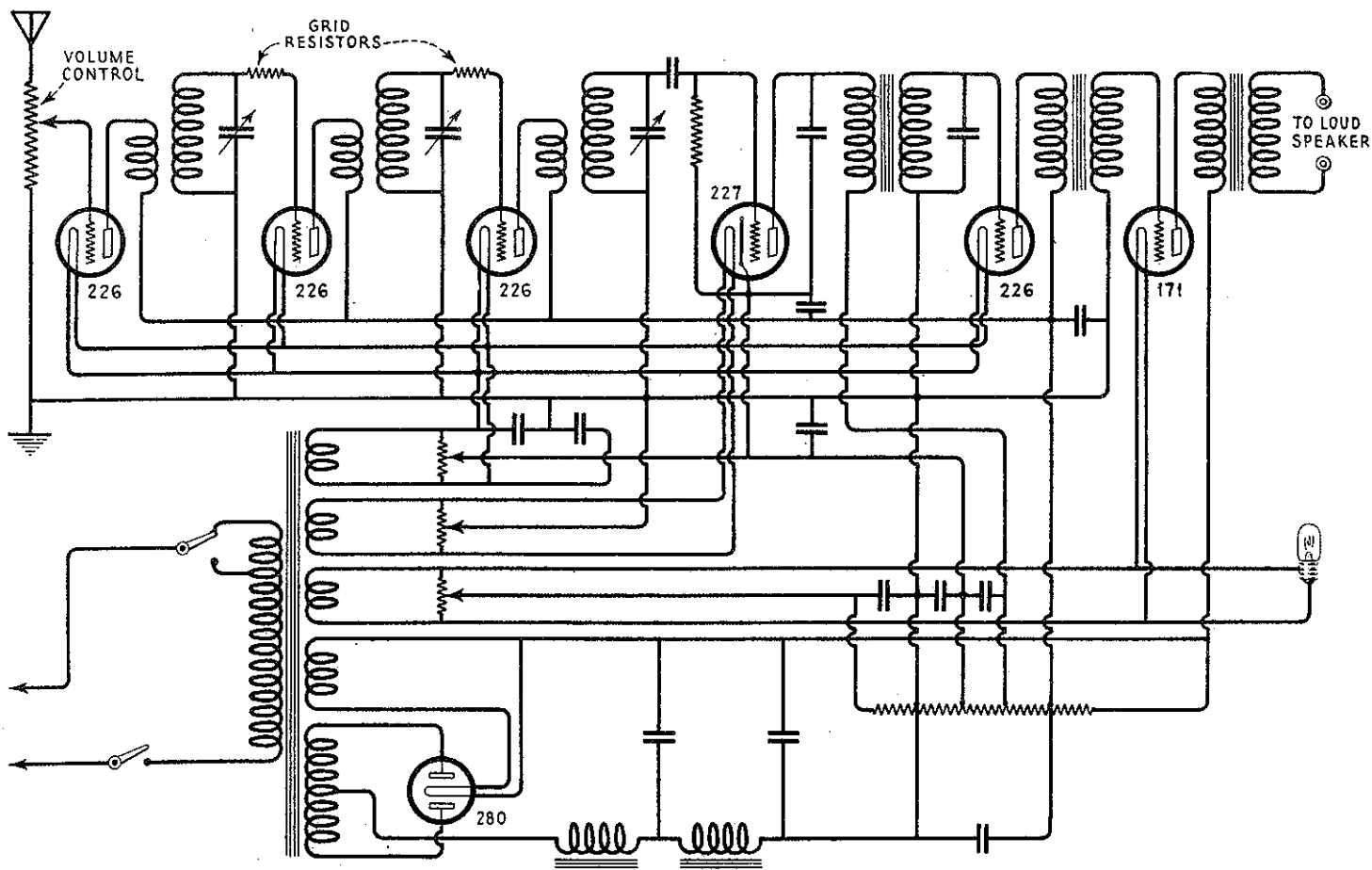
PFANSTEHL 34 AND 50 A.C.



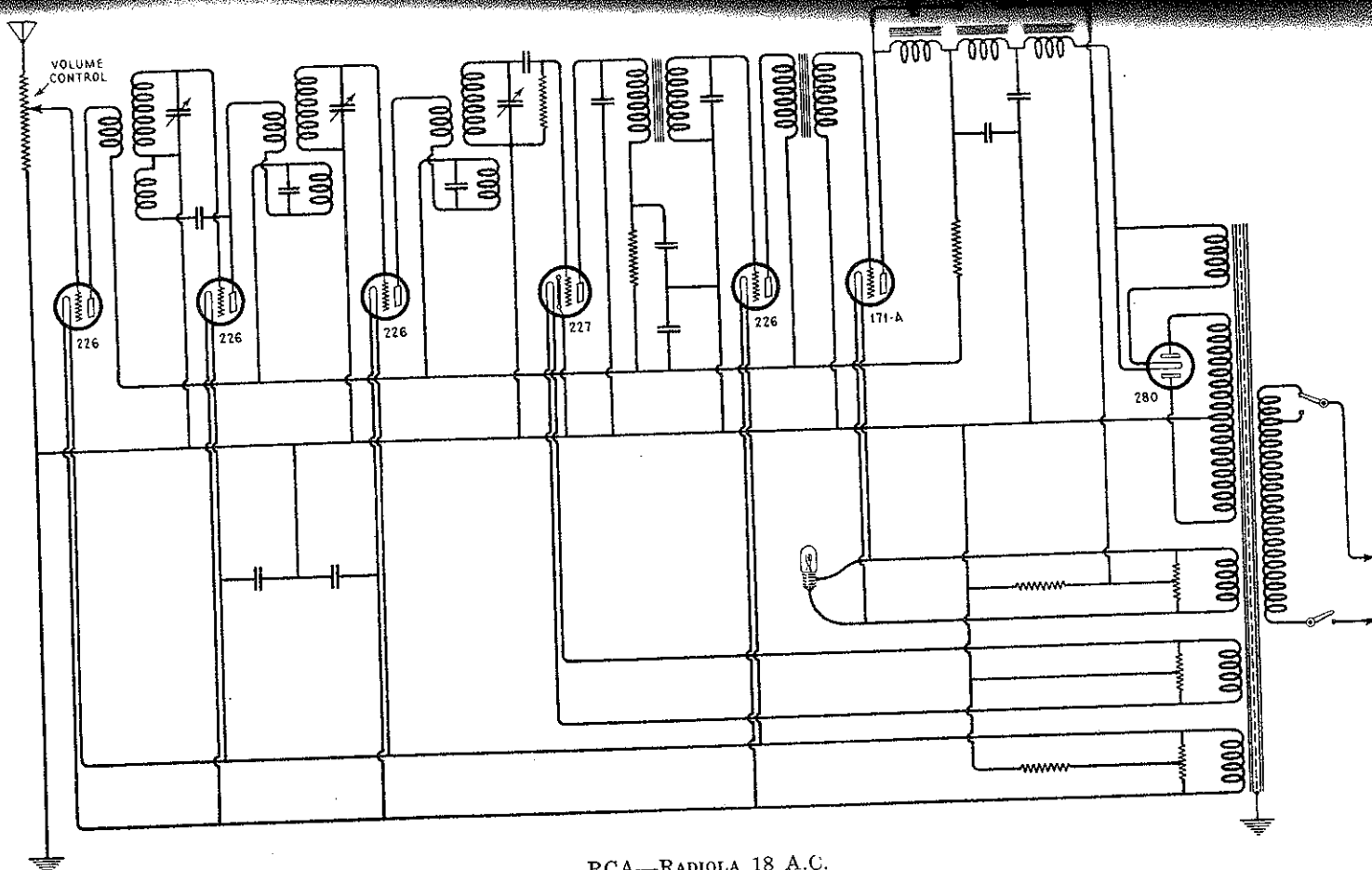
PHILCO ELECTRIC—SERIES 5



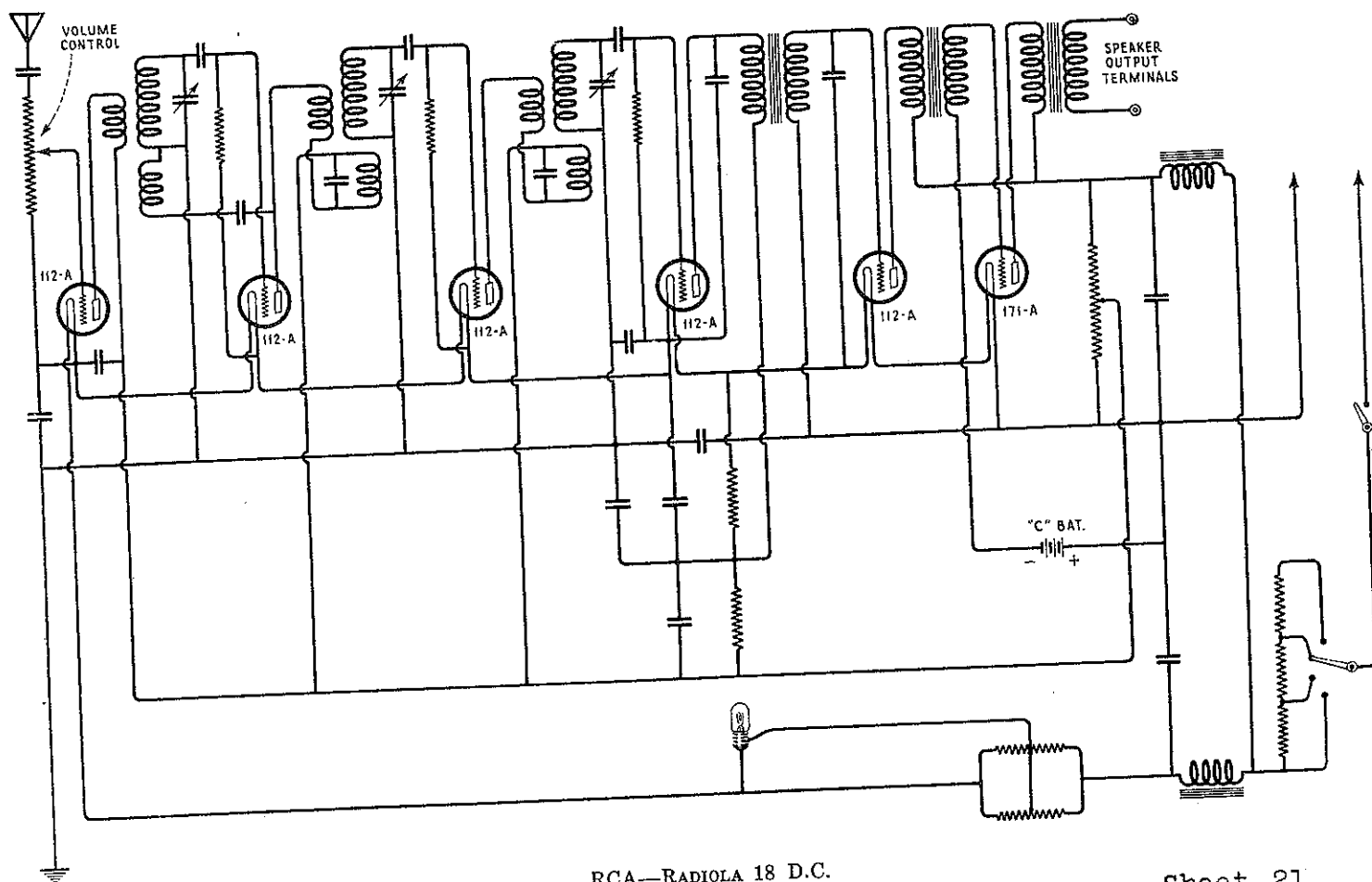
RCA—RADIOLA 16



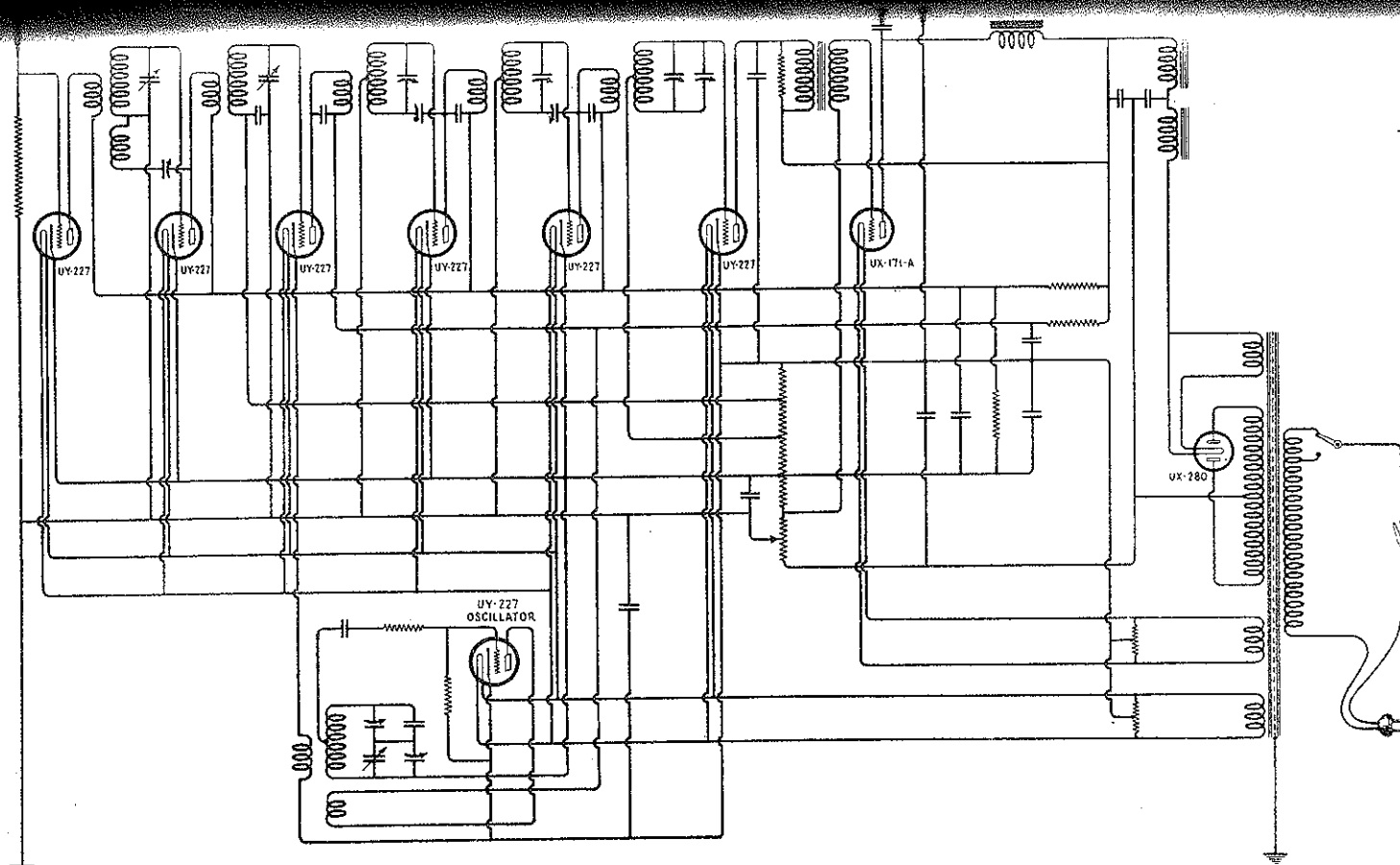
RCA—RADIOLA 17



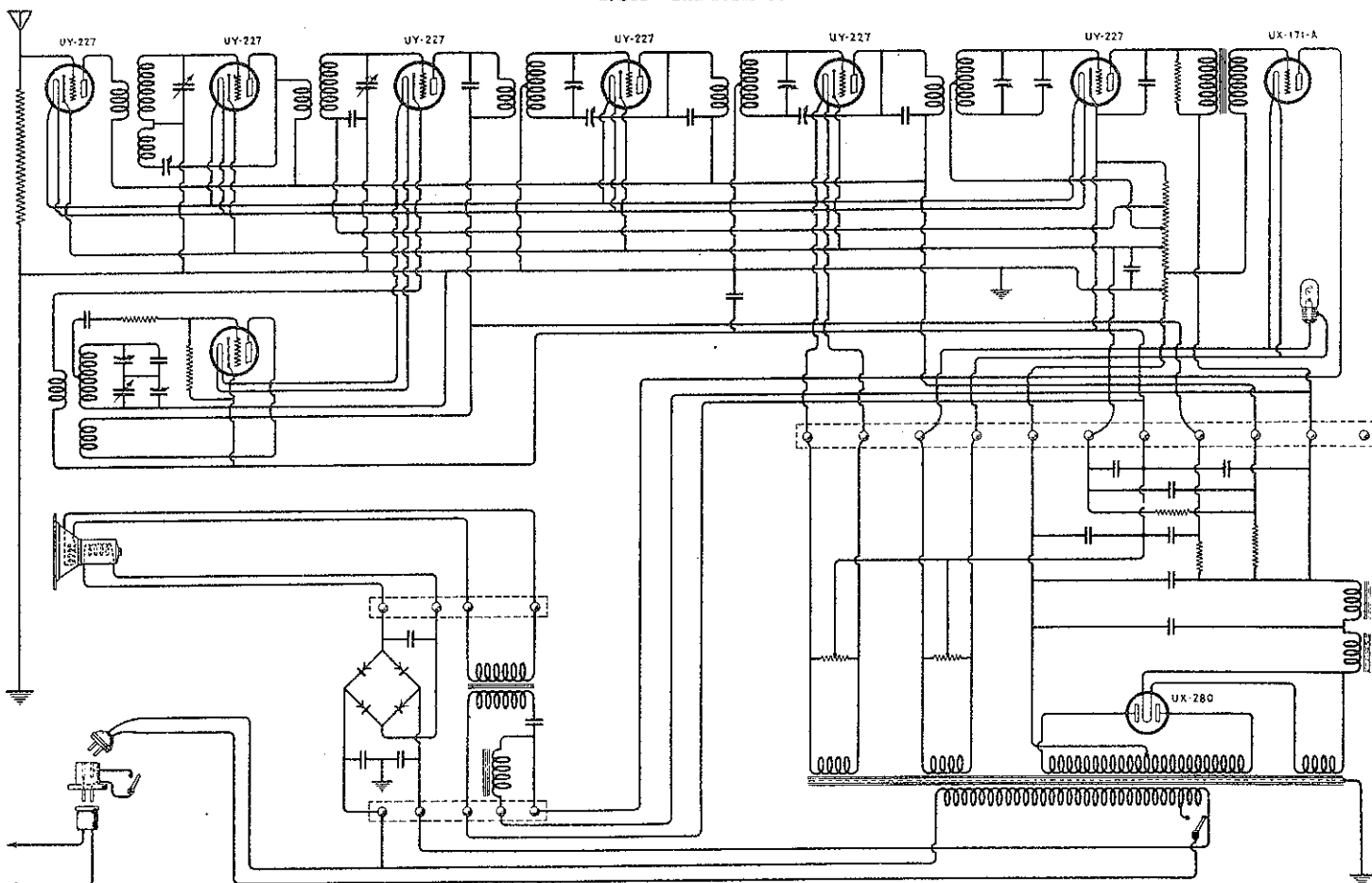
RCA—RADIOLA 18 A.C.



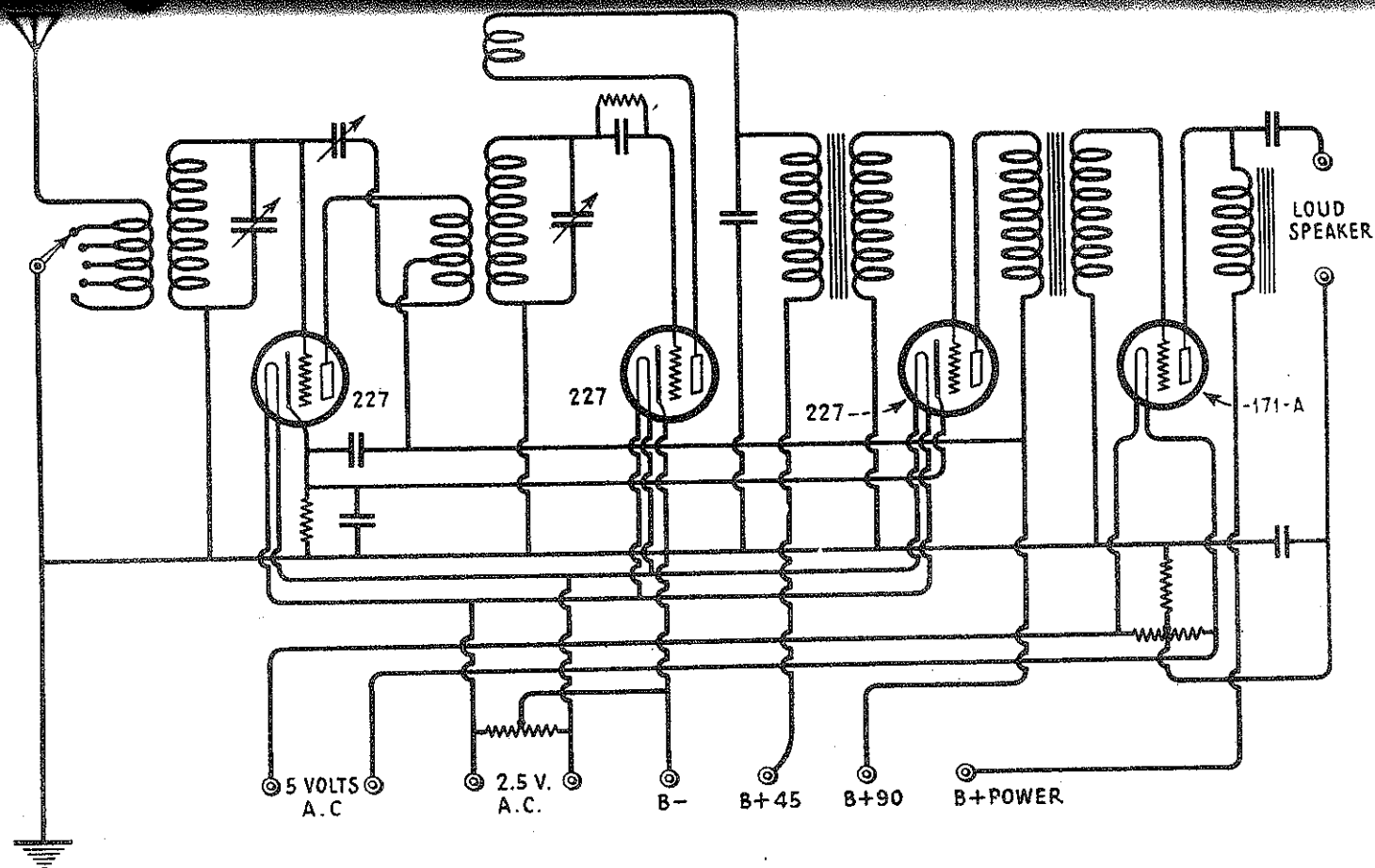
RCA—RADIOLA 18 D.C.



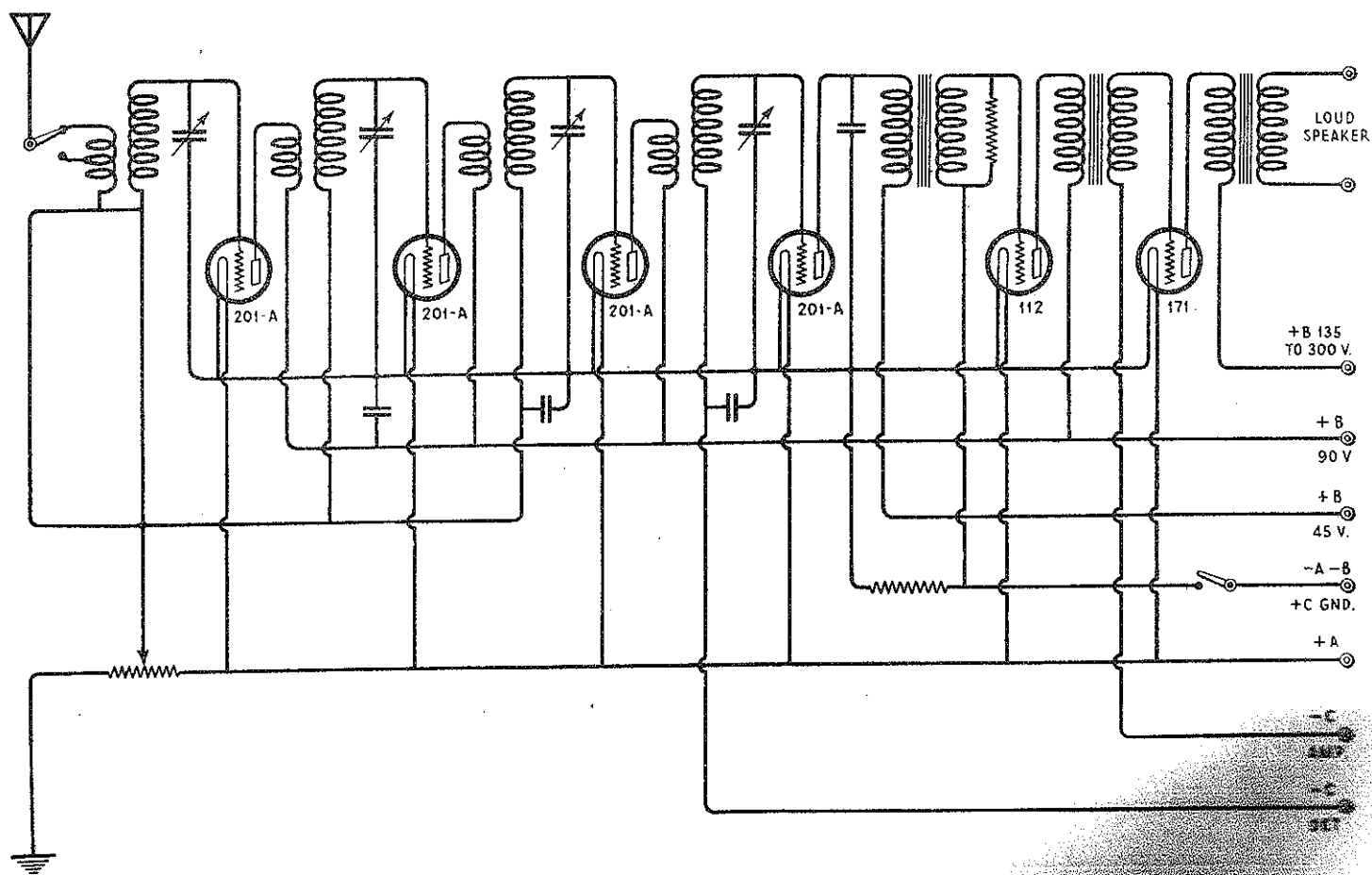
RCA—RADIOLA 60



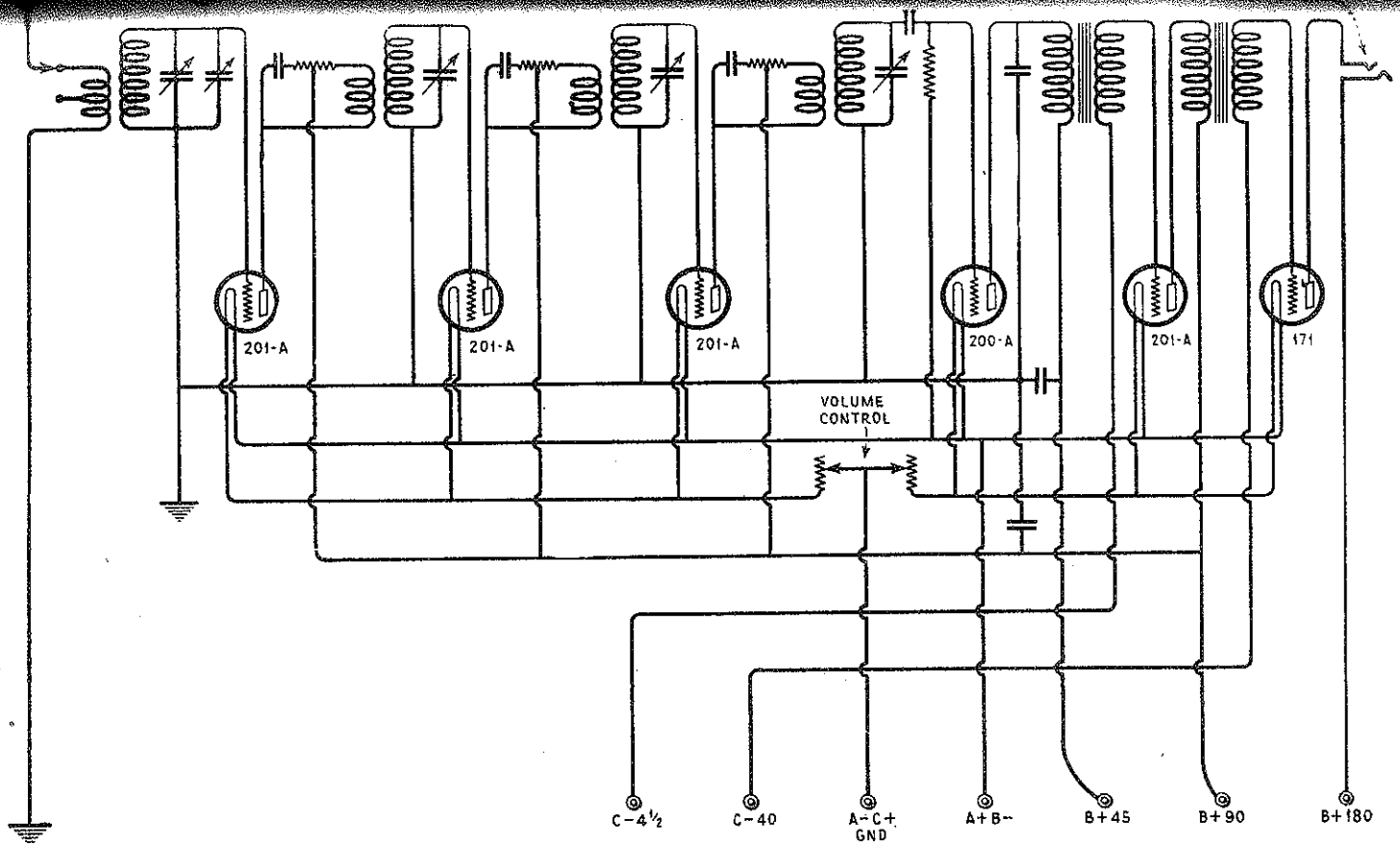
RCA—RADIOLA 62



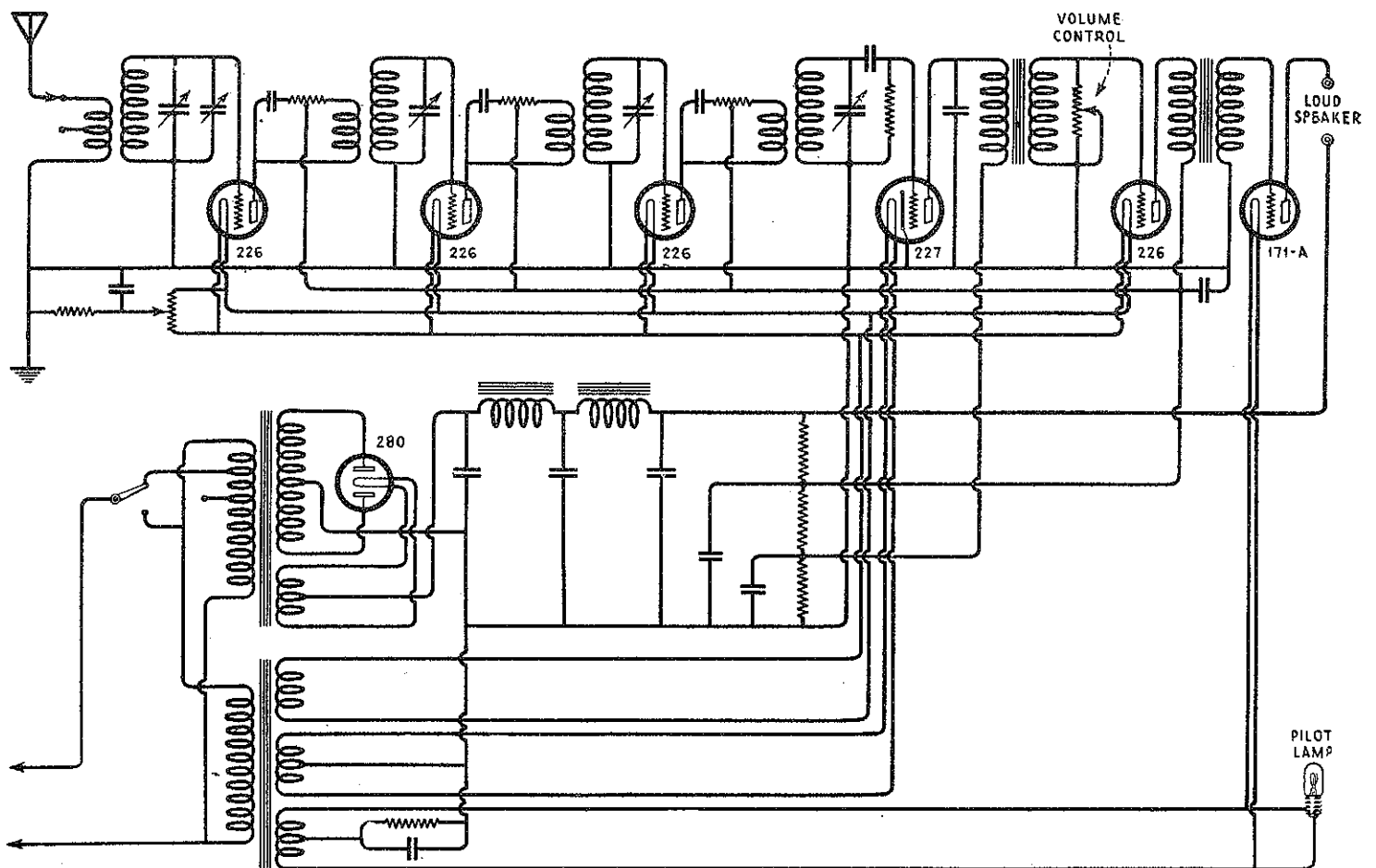
ROBERTS A.C.



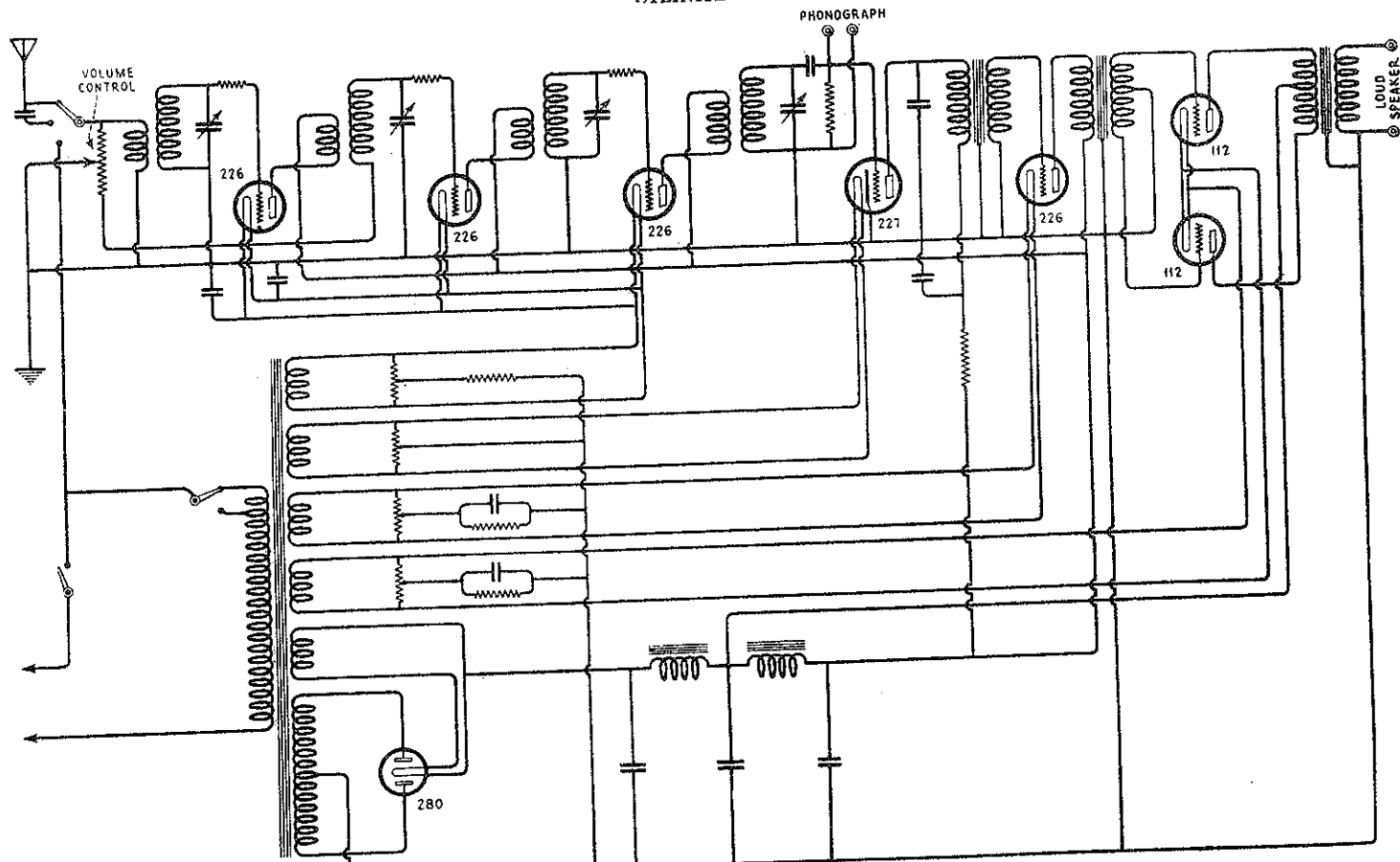
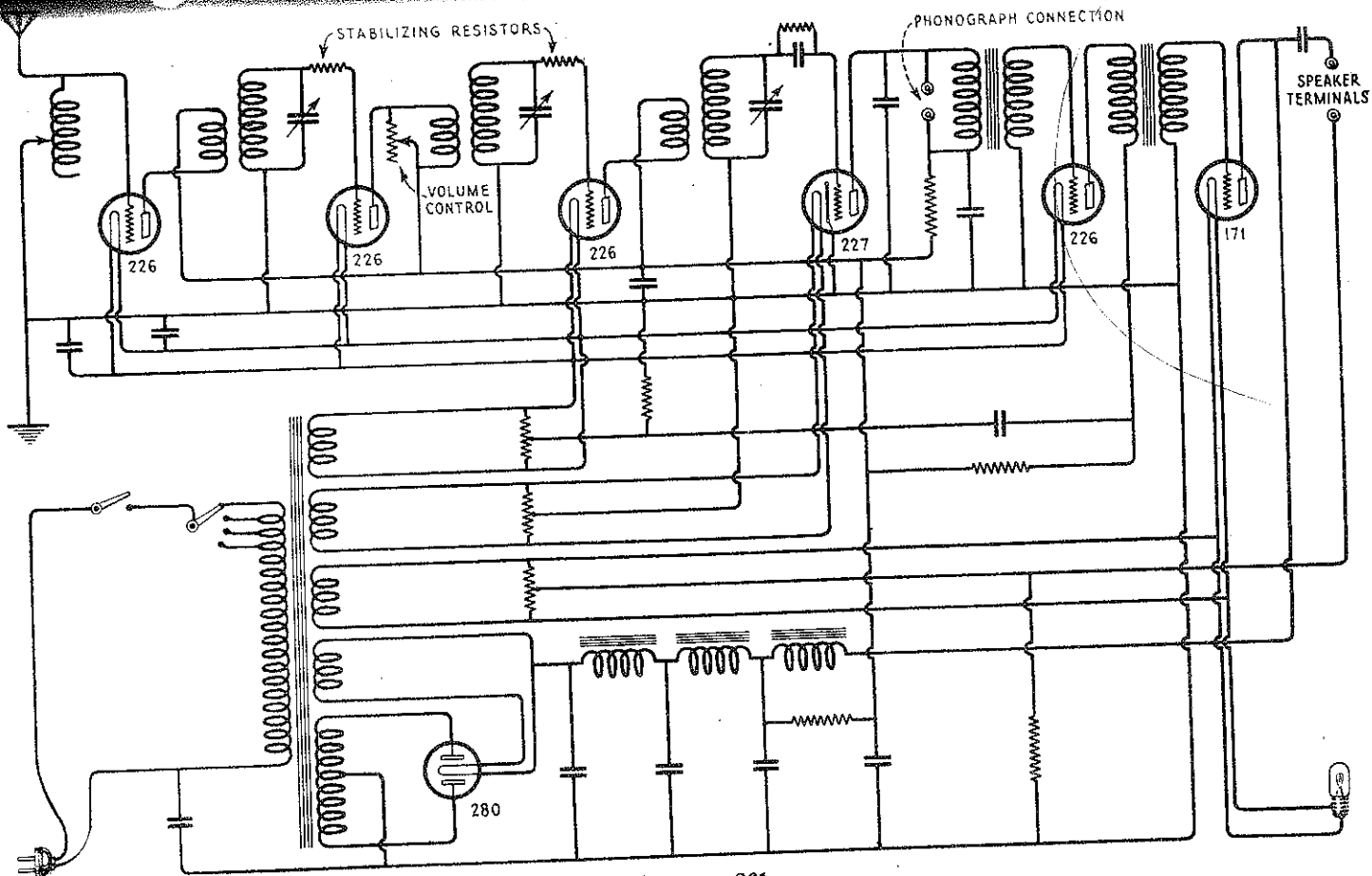
SILVER MARSHALL SHIELDED SIX—MODEL 630

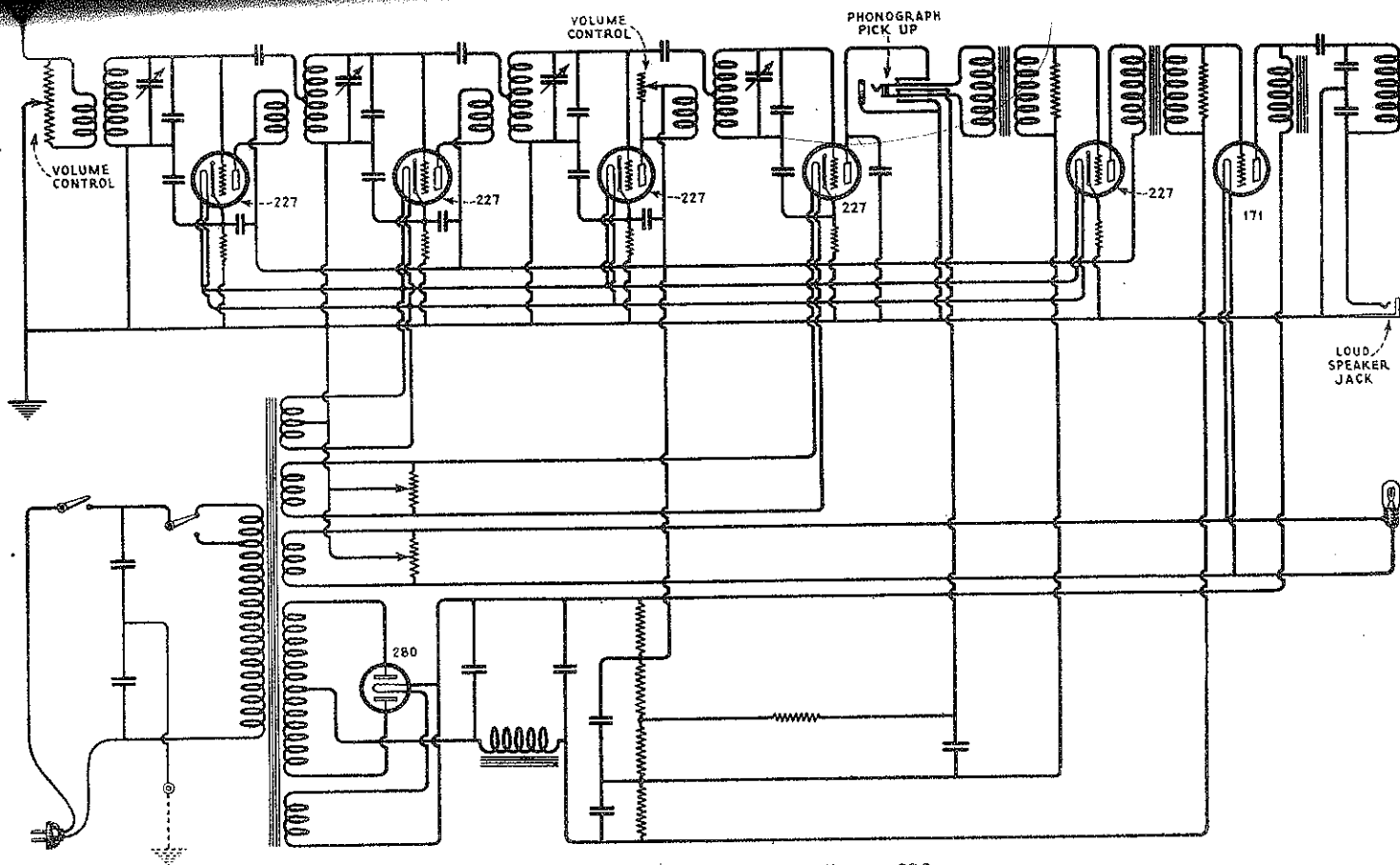


FRESHMAN EQUAPHASE

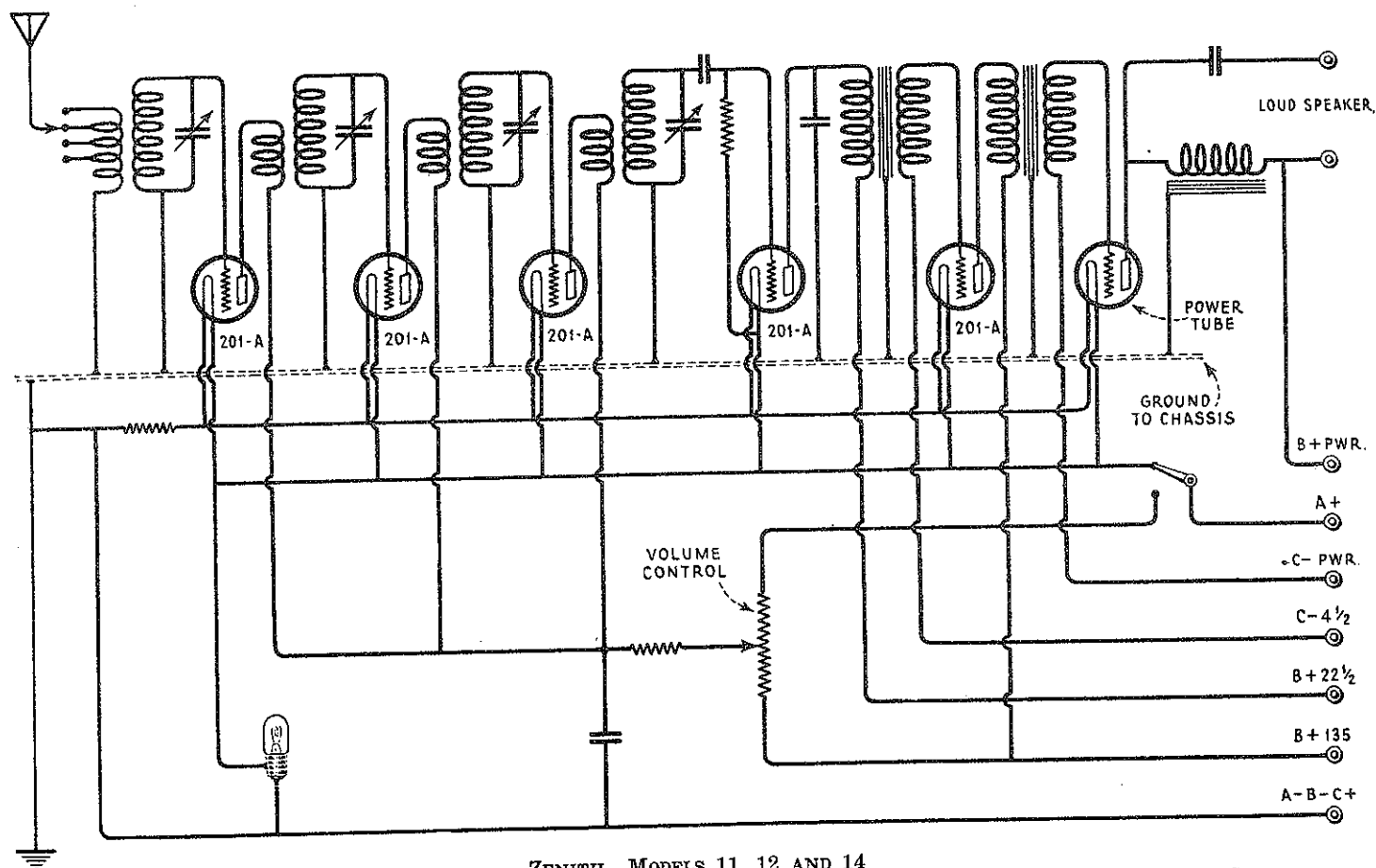


FRESHMAN—MODEL G





STROMBERG CARLSON—MODELS 635 AND 636



ZENITH—MODELS 11, 12 AND 14

GENERAL

DETECTION

AMPLIFICATION

DETECTORS
AND
AMPLIFIERS

Model	Use	Circuit Requirements	Base	Maximum Overall Height	Maximum Overall Diameter	"A" Supply	Filament Terminal Voltage	Filament Current (Amperes)	Detector Grid Return Lead to Grid	Grid Leak (Megohms)	Detector "B" Battery Voltage	Detector Plate Current (Milliamp.)	Amplifier "B" Battery Voltage	Amplifier "C" Battery Voltage	Amplifier Plate Current (Milliamp.)	A. C. Plate Resistance (Ohms)	Mutual Conductance (Micromhos)	Voltage Amplification Factor	Maximum Undistorted Output (Milliwatts)	
C-11 WD-11	Detector or Amplifier	Transformer Coupling	WD-11 Base	4-1/8"	1-3/16"	Dry Cell 1 1/2 V Storage 2 V	1.1	.25	+ F	3 to 5	22 1/2 to 45	1.5	90 135	4 1/2 10 1/2	2.5 3.5	15,500 15,000	425 440	6.6 6.6	7 35	
CX-12 WX-12	Detector or Amplifier	Transformer Coupling	Large Standard UX Base	4-11/16"	1-7/16"	Dry Cell 1 1/2 V Storage 2 V	1.1	.25	+ F	3 to 5	22 1/2 to 45	1.5	90 135	4 1/2 10 1/2	2.5 3.5	15,500 15,000	425 440	6.6 6.6	7 35	
CX-112A UX-112A	Detector or Amplifier	Transformer Coupling	Large Standard UX Base	4-11/16"	1-13/16"	Storage 6 V	5.0	.25	+ F	3 to 5	45	1.5	90 135	4 1/2 9	5.5 7	5,300 5,000	1,500 1,600	8 8	30 120	
C-299 UV-199	Detector or Amplifier	Transformer Coupling	UV 199 Base	3-1/2"	1-1/16"	Dry Cell 4 1/2 V Storage 4 V	3.0 3.3	.030 .063	+ F	2 to 9	45	1	90	4 1/2	2.5	15,500	425	6.6	7	
CX-299 UX-199	Detector or Amplifier	Transformer Coupling	Small Standard UX Base	4-1/8"	1-3/16"	Dry Cell 4 1/2 V Storage 4 V	3.0 3.3	.060 .063	+ F	2 to 9	45	1	90	4 1/2	2.5	15,500	425	6.6	7	
CX-300A UX-200A	Detector	Transformer or Resist. Coupling	Large Standard UX Base	4-11/16"	1-13/16"	Storage 6 V	5.0	.25	- F	2 to 3	45	1.5	Following UX-200-A Characteristics apply only for Detector Connection				30,000	666	20	
CX-301A UX-201A	Detector or Amplifier	Transformer Coupling	Large Standard UX Base	4-11/16"	1-13/16"	Storage 6 V	5.0	.25	+ F	2 to 9	45	1.5	90 135	4 1/2 9	2.5 3	11,000 10,000	725 800	S S	15 55	
CX-322 UX-222	Radio Freq. Amplifier	Special Shielding	Large Standard UX Base	5-3/8"	1-13/16"	Dry Cell 4 1/2 V Storage 4.6 V	3.3	.132	.....	.....	.....	.....	135	1 1/2	1.5	850,000	350	300	M	
CX-322 UX-222	Audio Freq. Amplifier	Resistance Coupling	Large Standard UX Base	5-3/8"	1-13/16"	Dry Cell 4 1/2 V Storage 4.6 V	3.3	.132	.....	.....	.....	.....	180X	1 1/2	.3	150,000	400	60	....	
CX-326 UX-226	Amplifier A-C Filament Type	Transformer Coupling	Large Standard UX Base	4-11/16"	1-13/16"	Transformer 1.5 V	1.5	1.05	.....	.....	.....	.....	90 135 180	6 9 13 1/2	3.5 6 7.5	9,400 7,400 7,000	875 1,100 1,170	8.2 8.2 8.2	20 70 160	
CX-327 UY-227	Detector A-C Heater Type	Transformer Coupling	5 Prong Standard UY Base	4-11/16"	1-13/16"	Transformer 2.5 V	2.5 H	1.75	C	2-9 4-1	45 90	2 7	Following UY-227 Characteristics apply only for Detector Connection				10,000 8,000	800 1,000	8 8	
CX-340 UX-240	Detector or Amplifier	Resistance Coupling	Large Standard UX Base	4-11/16"	1-13/16"	Storage 6 V	5.0	.25	+ F	2 to 5	135X 190X	.3 .4	135 180	1 1/2 3	.2 .2	150,000 150,000	200 200	30 30	....	
CX-112A UX-112A	Power Amplifier	No. L. S. C. Required	Large Standard UX Base	4-11/16"	1-13/16"	Storage 6 V Transf. 5 V	5.0	.25	.....	.....	.....	.....	157 1/2	9 10 1/2	7 9.5	5,000 4,700	1,600 1,700	8 8	120 195	
CX-220 UX-120	Power Amplifier	No. L. S. C. Required	Small Standard UX Base	4-1/8"	1-3/16"	Dry Cell 4 1/2 V Storage 4 V	3.0 3.3	.125 .132	.....	.....	.....	.....	135	22 1/2	6.5	6,300	525	3.3	110	
CX-371A UX-171A	Power Amplifier	L.S.C. Except at 90 V	Large Standard UX Base	4-11/16"	1-13/16"	Storage 6 V Transf. 5 V	5.0	.25	.....	.....	.....	.....	90 135 180	16 1/2 27 40 1/2	10 16 20	2,500 2,200 2,000	1,200 1,360 1,500	3.0 3.0 3.0	130 330 700	
CX-310 UX-210	Power Amplifier	L. S. C.	Large Standard UX Base	5-5/8"	2-3/16"	Transformer 7.5 V	7.5	1.25	.....	.....	.....	.....	250 300 350 400 425	18 22 1/2 27 31 1/2 35	10 13 16 18 18	6,000 5,800 5,150 5,000 5,000	1,330 1,450 1,550 1,600 1,600	8 8 8 8 8	340 600 925 1,325 1,540	
CX-350 UX-250	Power Amplifier	L. S. C.	Large Standard UX Base	6-1/4"	2-11/16"	Transformer 7.5 V	7.5	1.25	.....	.....	.....	.....	250 300 350 400 450	45 54 63 70 84	28 35 45 55 55	2,100 2,000 1,900 1,800 1,800	1,800 1,900 2,000 2,100 2,100	3.8 3.8 3.8 3.8 3.8	900 1,500 2,350 3,250 4,650	

POWER
AMPLIFIERS

RECTIFIERS

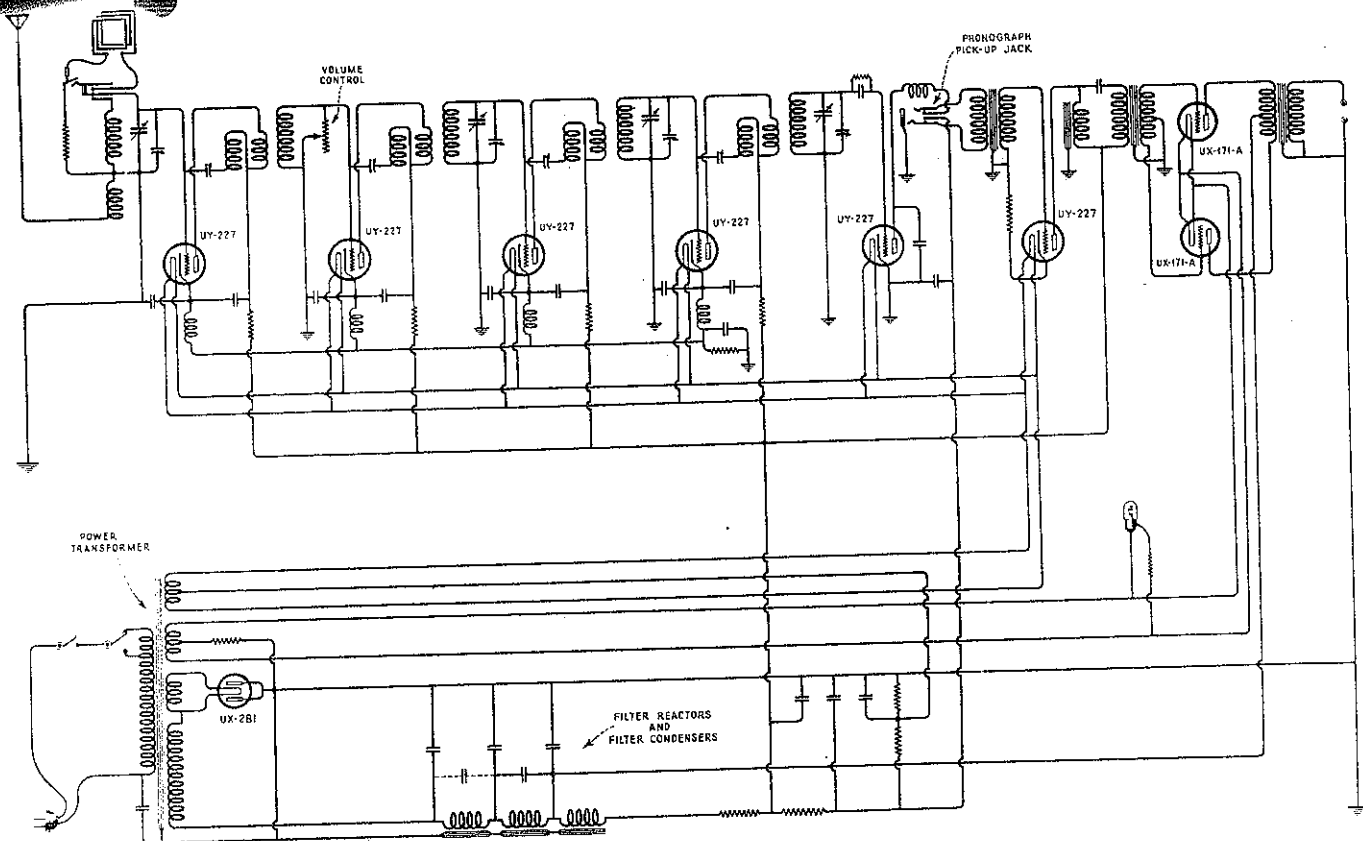
MISCELLANEOUS

Model	Use	Circuit Requirements	Base	Maximum Overall Height	Maximum Overall Diameter	Purpose
UX-213	Full-Wave Rectifier	Full-Wave Circuit	Large Standard UX Base	5-5/8"	2-3/16"	Rectification in Eliminators particularly Designed for this tube
UX-216B	Half-Wave Rectifier	Half or Full Wave Circuit	Large Standard UX Base	5-5/8"	2-3/16"	Rectification in Eliminators particularly Designed for this tube
CX-380 UX-280	Full-Wave Rectifier	Full-Wave Circuit	Large Standard UX Base	5-5/8"	2-3/16"	Rectification in Eliminators Designed for this tube or Rectron UX 213
CX-381 UX-281	Half-Wave Rectifier	Half or Full Wave Circuit	Large Standard UX Base	6-1/4"	2-7/16"	Rectification in Eliminators Designed for this tube or tube UX-216B
CX-374 UX-874	Voltage Regulator	Series Resistance	Large Standard UX Base	5-5/8"	2-3/16"	Constant Voltage Device
CX-376 UY-876	Current Regulator (Ballast Tube)	Transformer Primary of 65 Volts for use on 115 Volt line	Standard Mogul Type Screw Base	8"	2-1/16"	Constant Current Device
UY-886	Current Regulator (Ballast Tube)	Transformer Primary of 65 Volts for use on 115 Volt line	Standard Mogul Type Screw Base	8"	2-1/16"	Constant Current Device

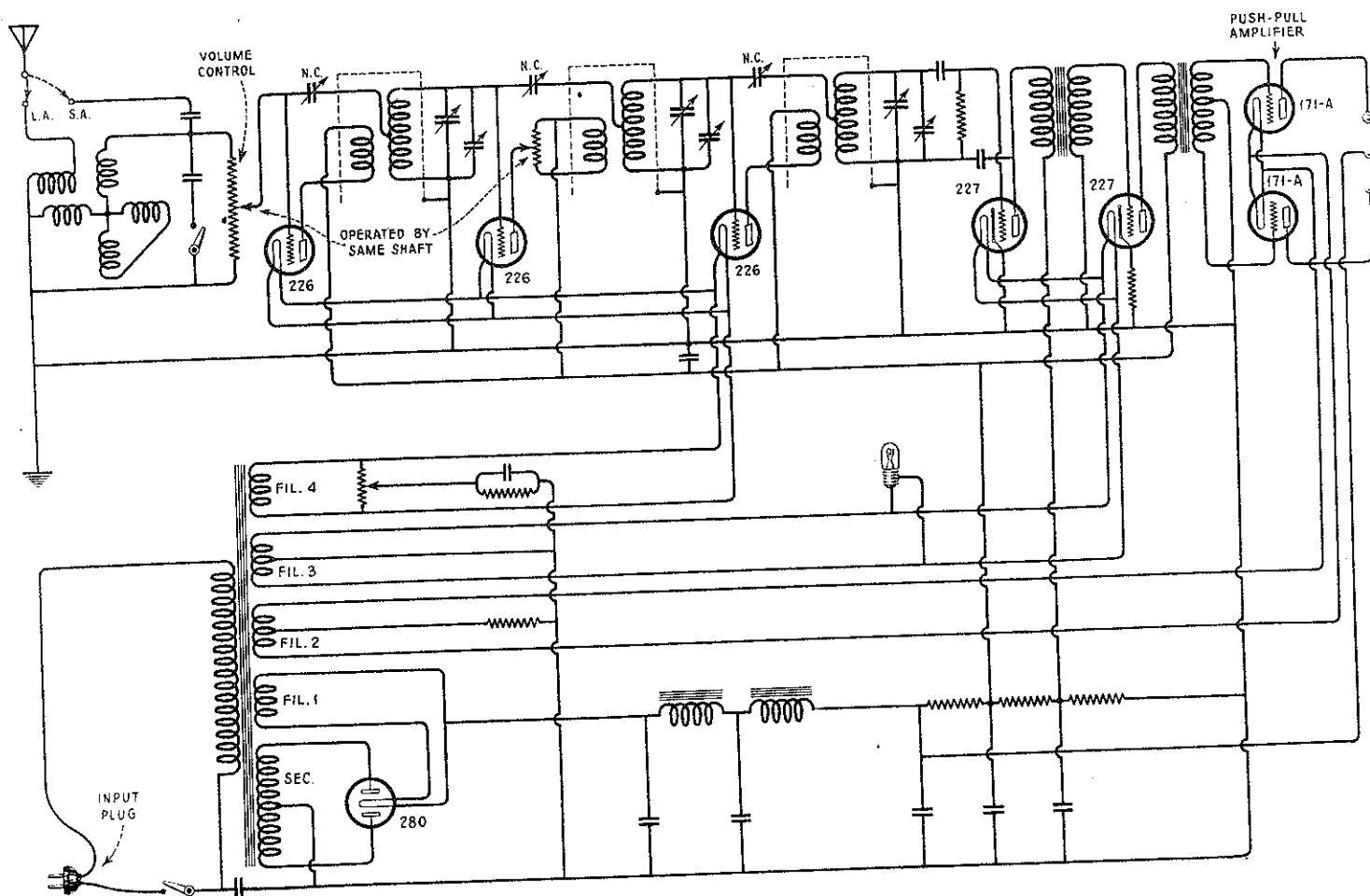
†(4) Note other use of this tube above (below)
 * Inner Grid—1 1/2 Volts; Outer Grid +45 Volts, .15 Milliampers
 □ Outer Grid—1 1/2 Volts; Inner Grid +22 1/2 Volts, .6 Milliampers
 X Applied through plate coupling resistance of 250,000 Ohms
 Note.—All grid voltages are given with respect to cathode or negative filament terminal

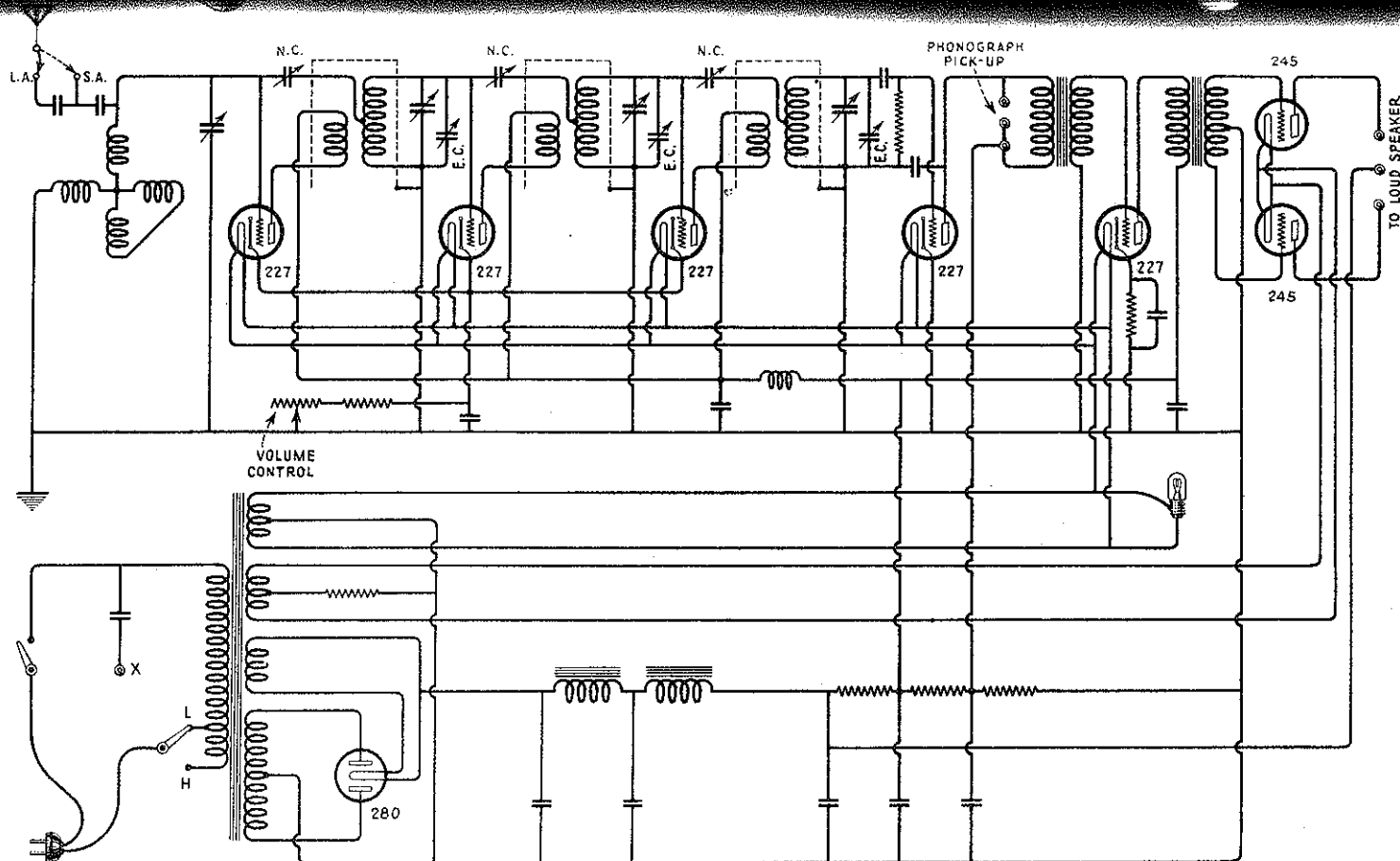
Max. Values not to be exceeded

A.....Except for half ampere filament, UX-112 and UX-171 characteristics are identical respectively to UX-112-A and UX-171-A.
 C.....Cathode
 H.....Heater Voltage
 LCS.....Load Speaker Coupling, consisting of either Choke Coil and By-Pass Condenser or Output Transformer of 1:1 or step down ratio, recommended wherever plate current (D-C) exceeds 10 milliamperes
 M.....With a screen-grid tube, on account of circuit limitations, the actual voltage amplification obtainable does not bear as high a relation to the voltage amplification factor as in the case of three electrode tubes

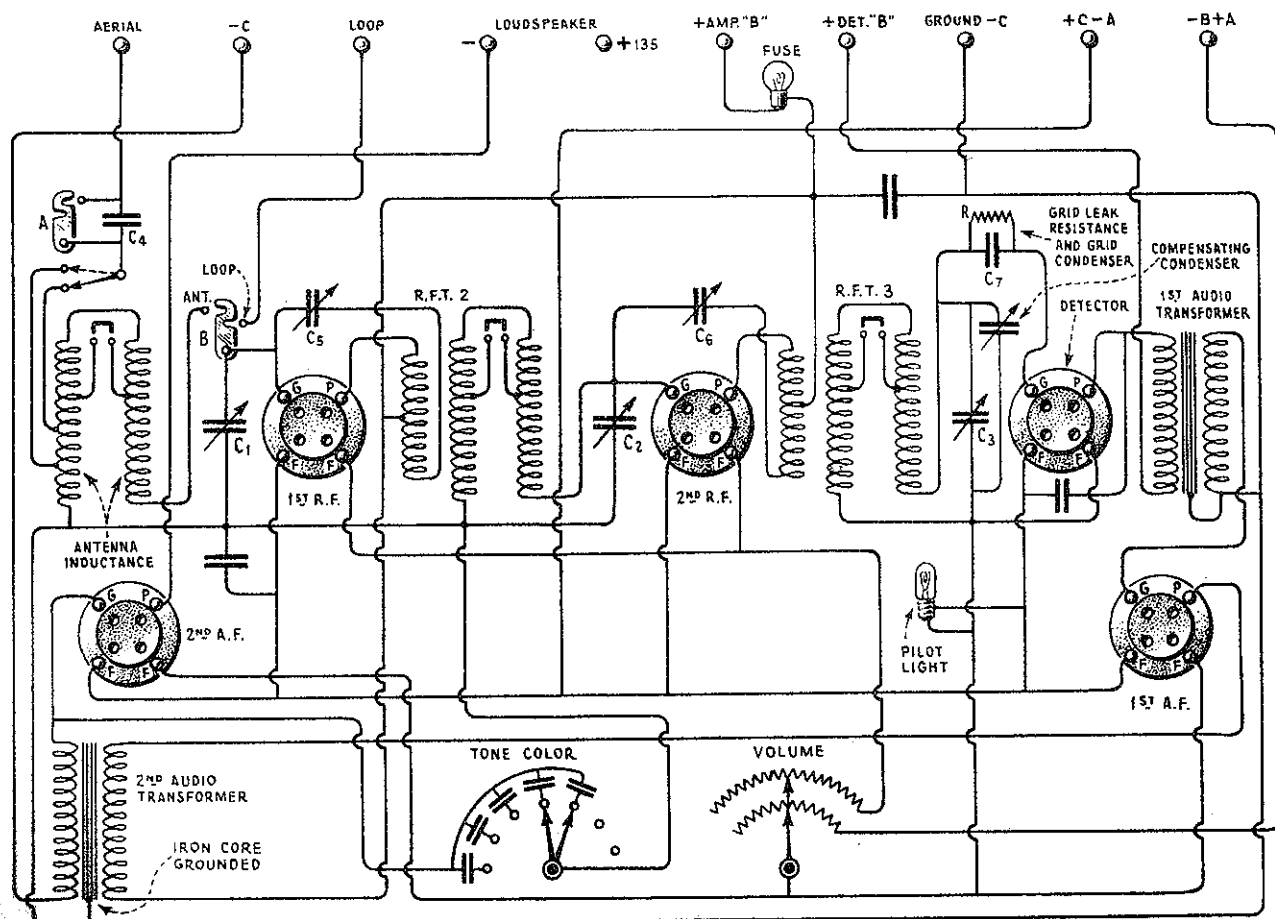


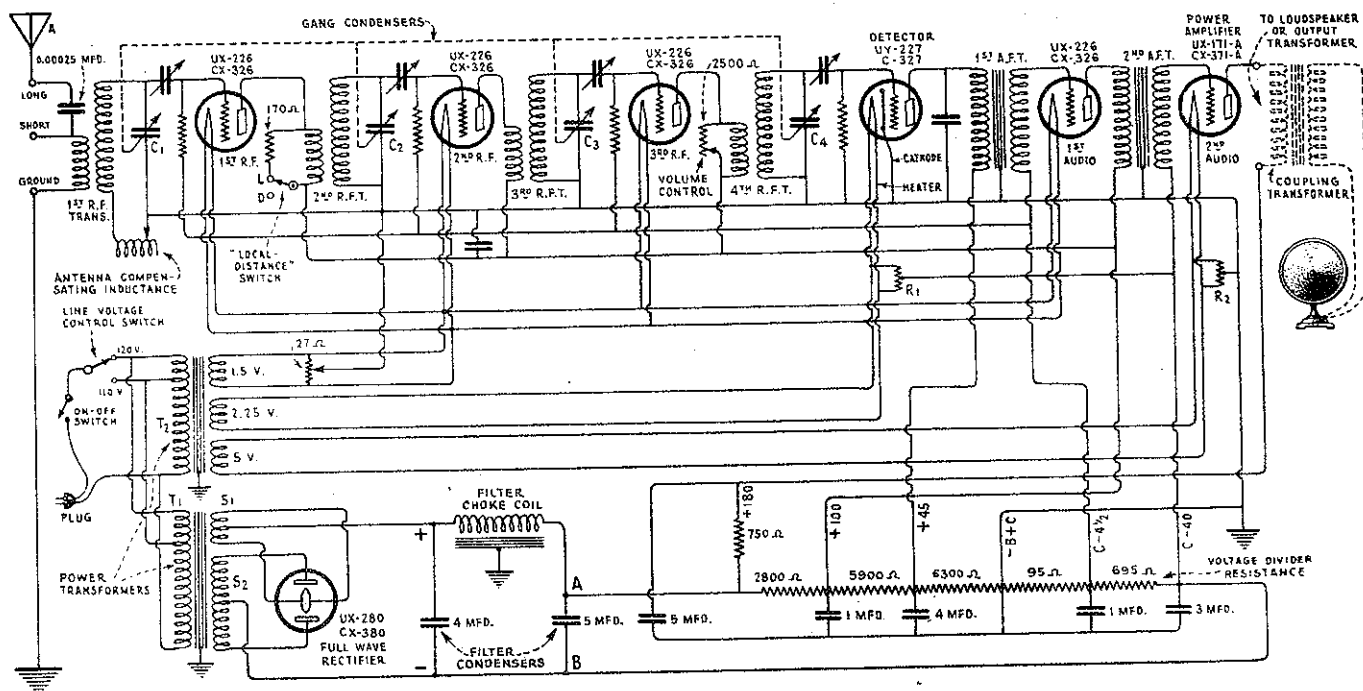
Fada Models 50, 70, 71 and 72



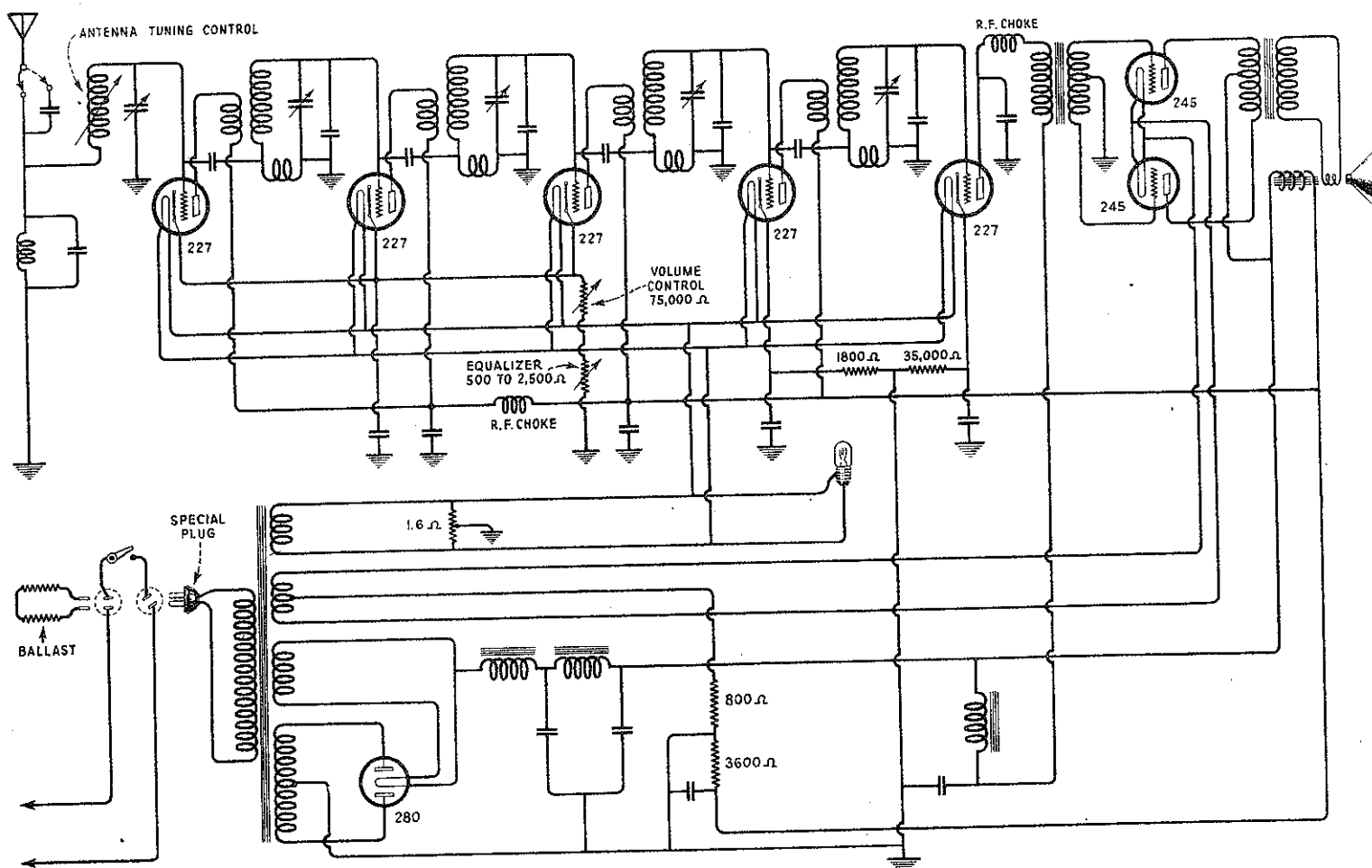


Freed-Eisemann NR 78

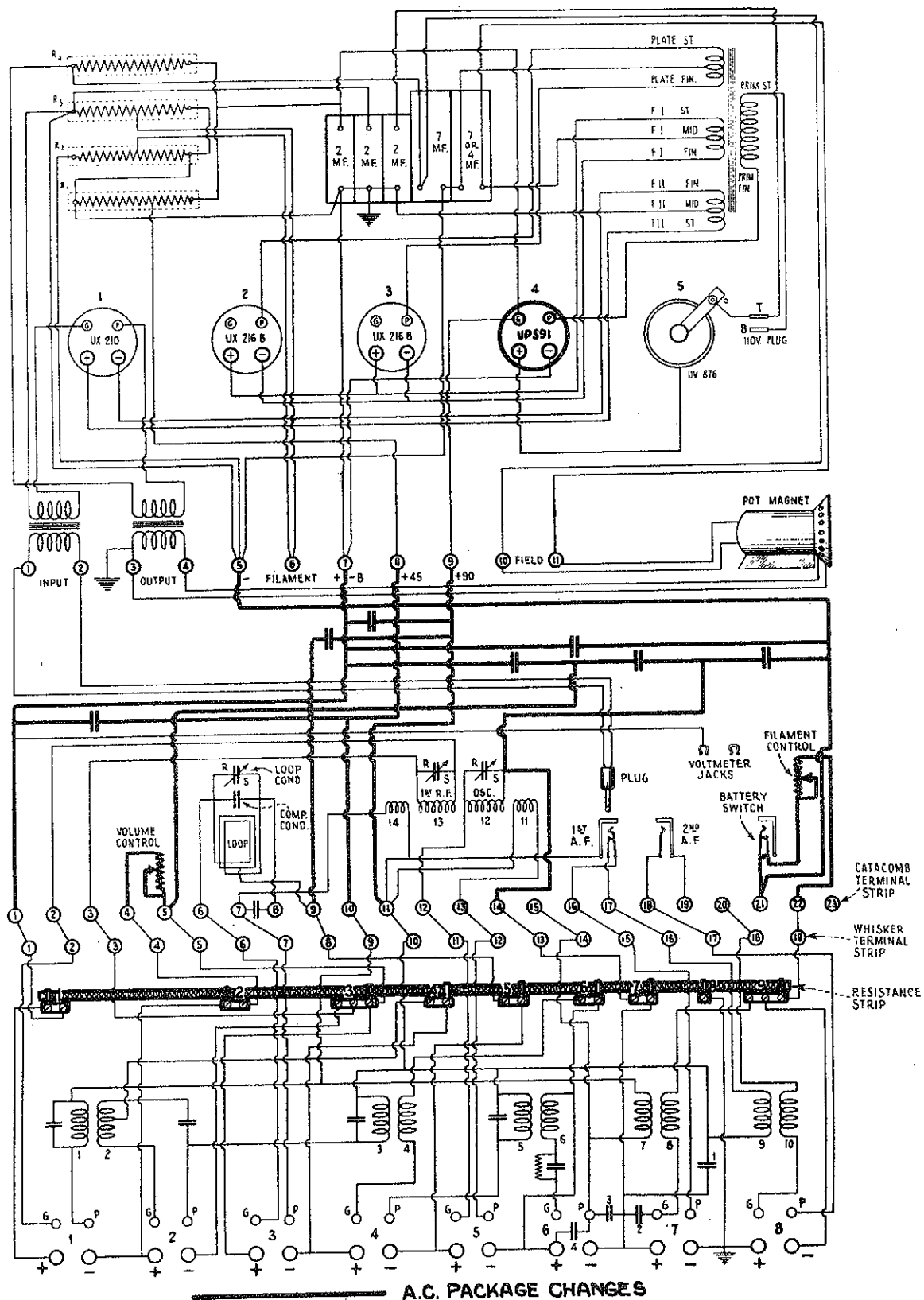




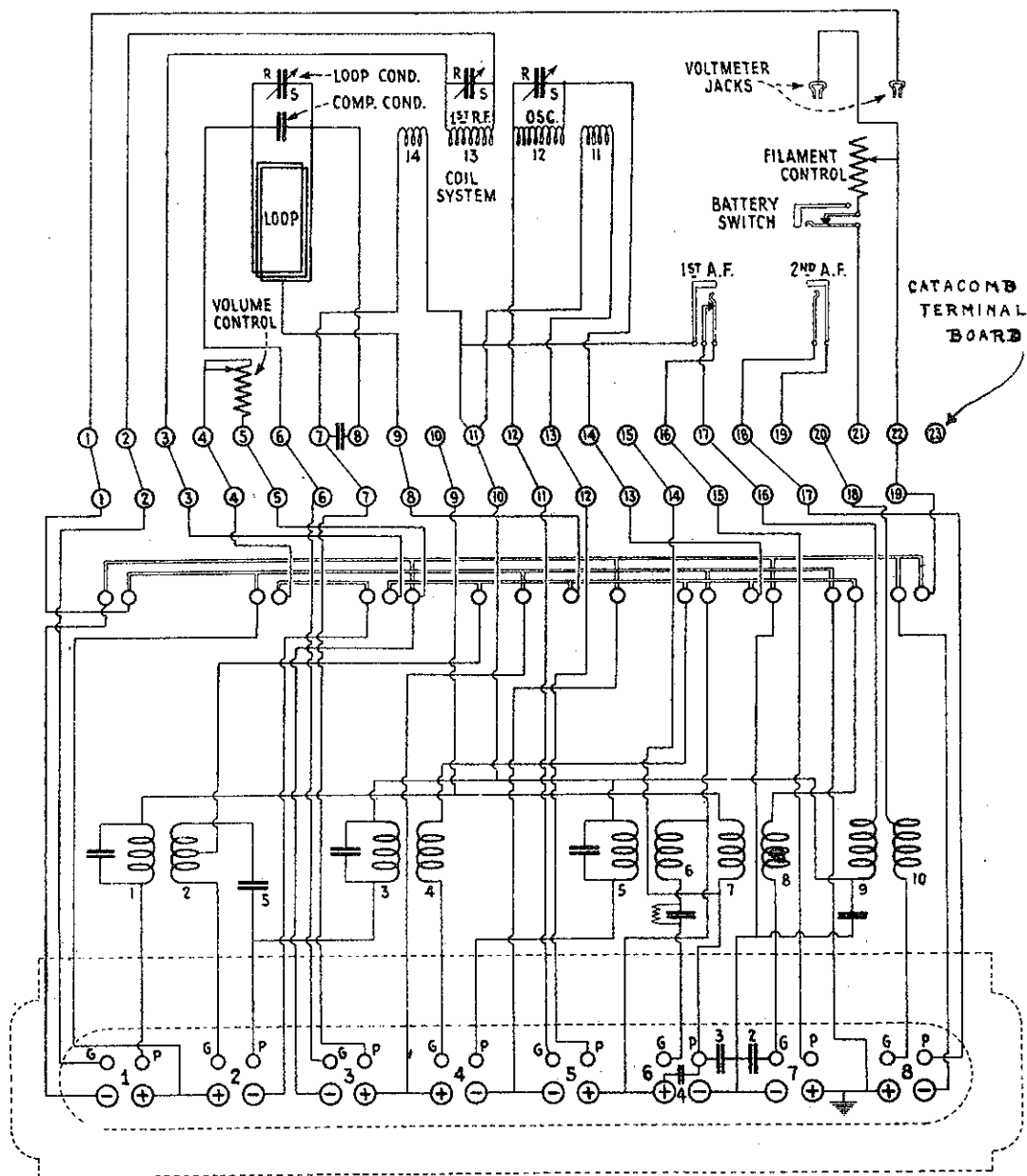
Grebe A.C. Six



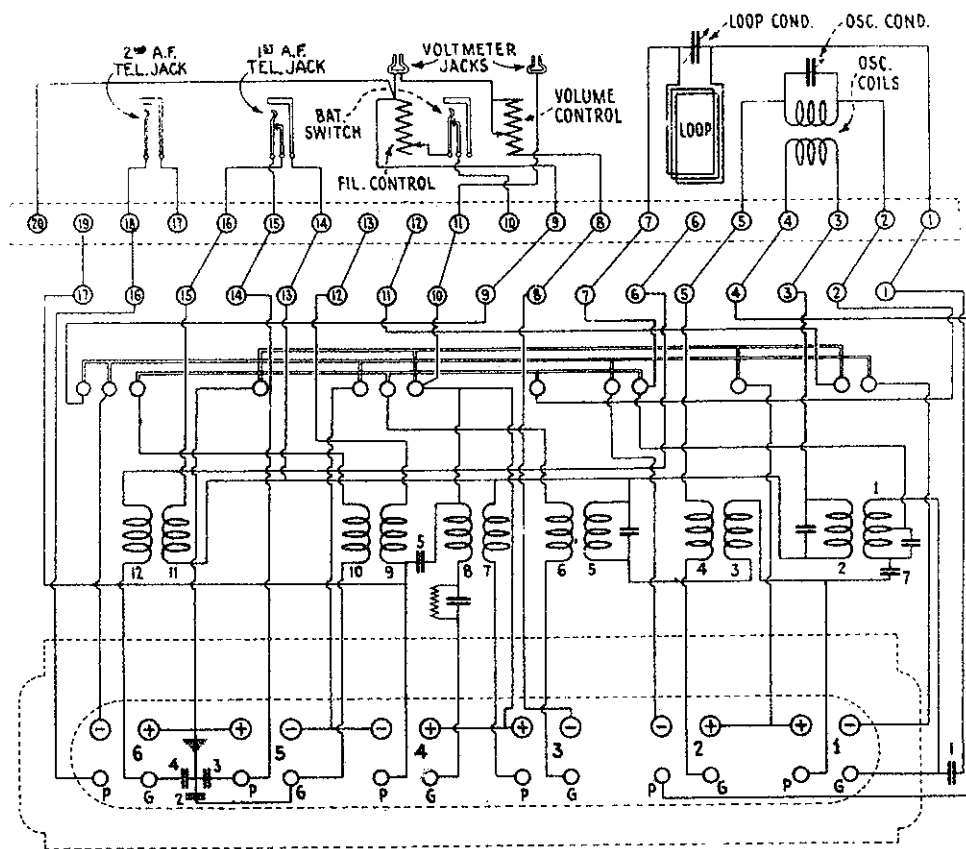
Majestic Model 90



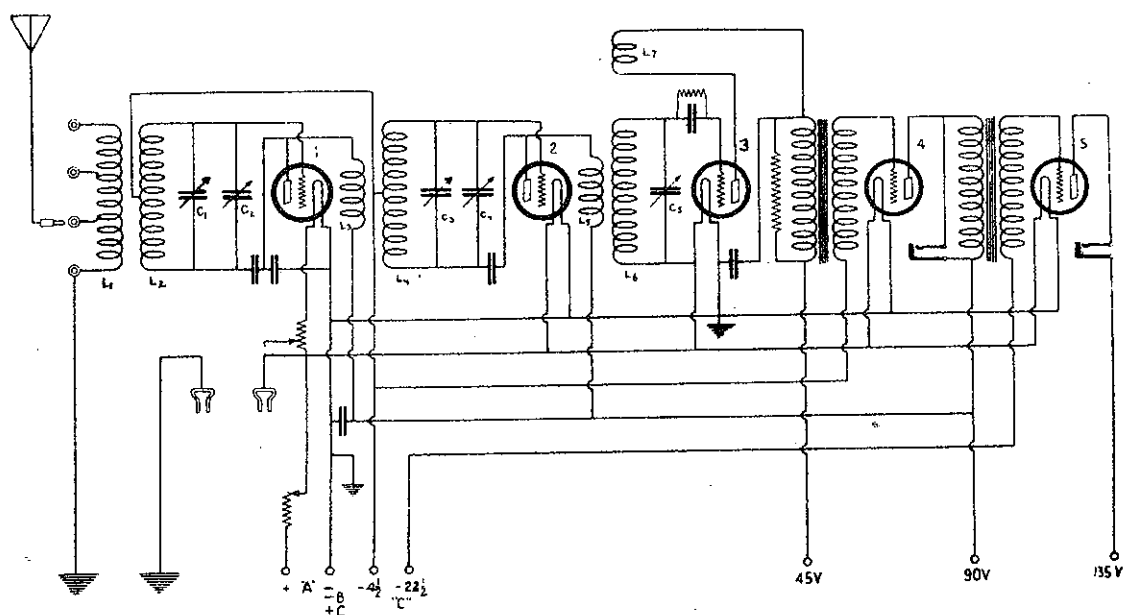
RCA Radiola 28 - A.C. Operated



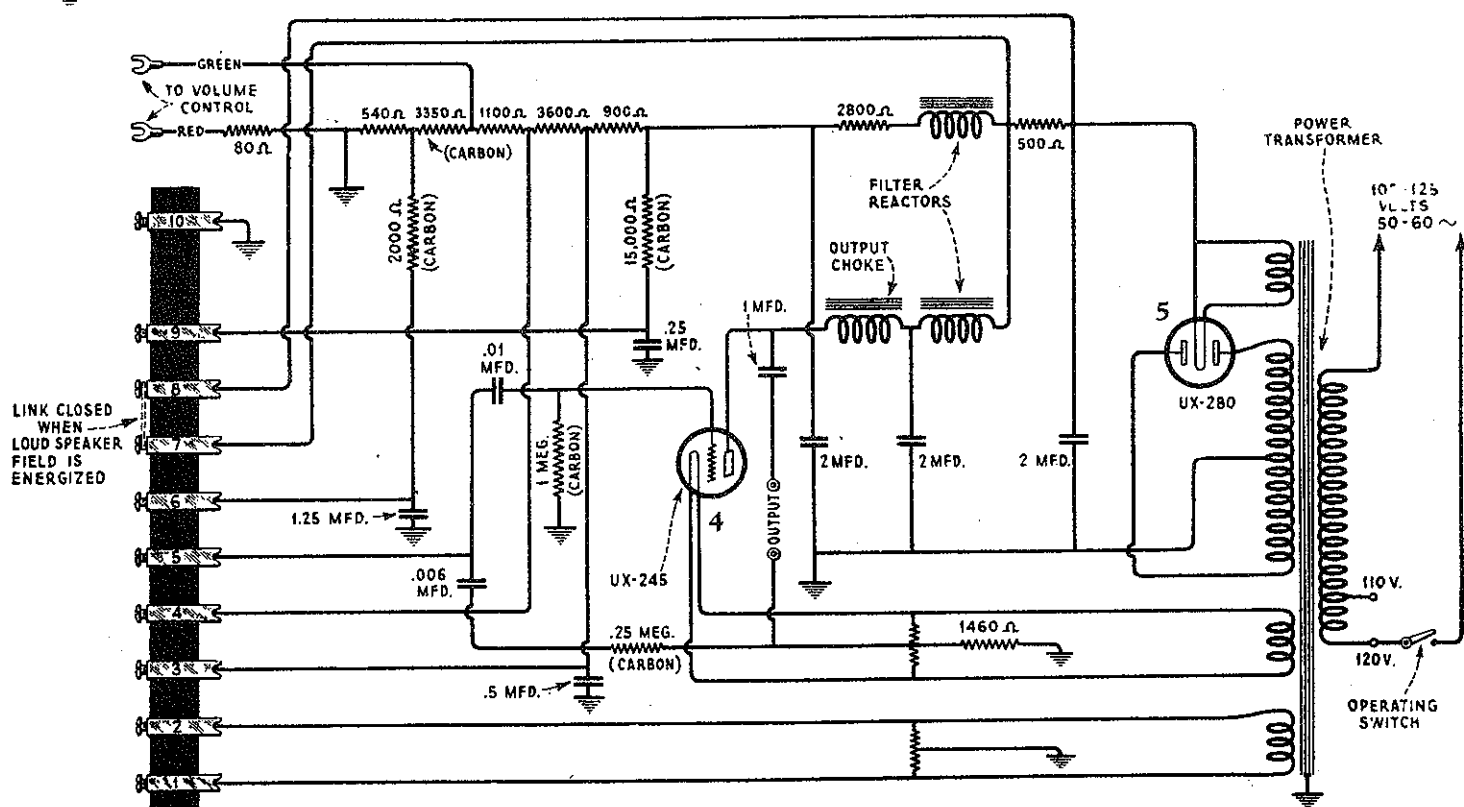
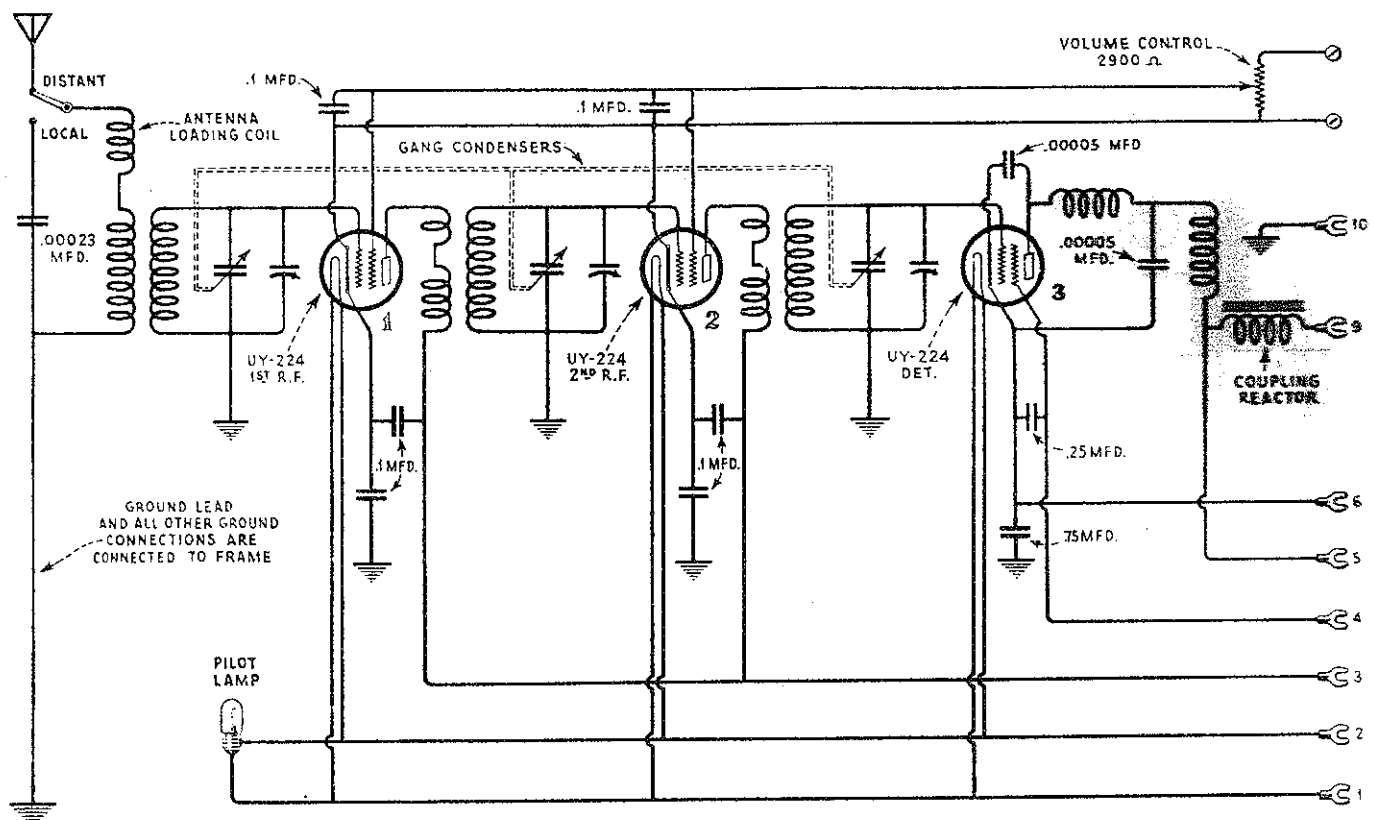
RCA Radiola 28 - Battery Operated



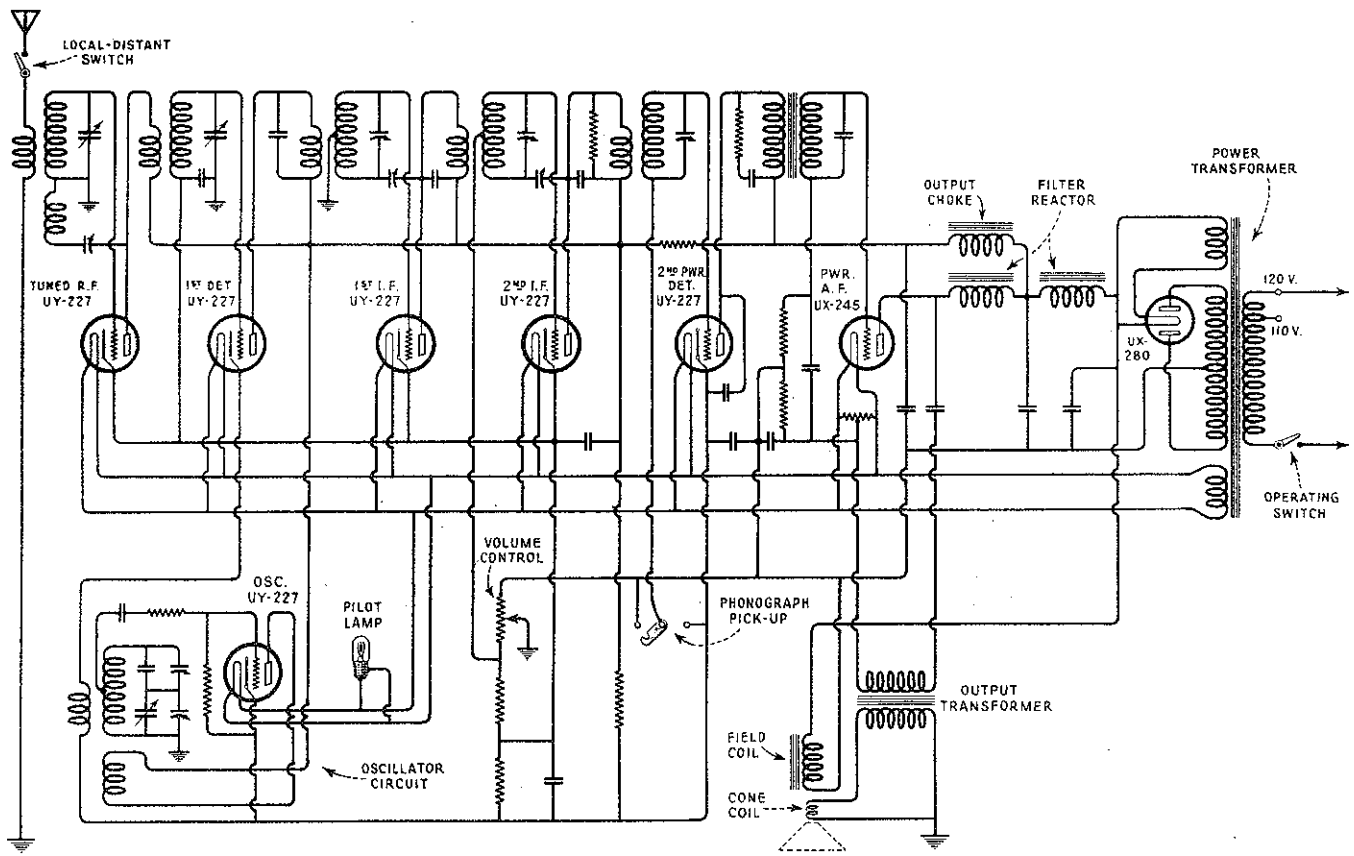
RCA Radiola 25



RCA Radiola 20



RCA Radiola 44



RCA Radiola 66

